Evolutionary Systematics 1 2017, 87–109 | DOI 10.3897/evolsyst.1.14969

PENSOFT

EVOLUTIONARY SYSTEMATICS

The goblin spiders (Araneae, Oonopidae) of the OTONGA Nature Reserve in Ecuador, with the description of seven new species

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http://zoobank.org/0530C3AA-584D-429A-B80E-9457F507B94F

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Received 10 July 2017
Accepted 17 July 2017
Published 22 December 2017

Academic editor:
Andreas Schmidt-Rhaesa

Key Words

Goblin spiders
neotropical forests
biodiversity hotspots
taxonomy
new species

Abstract

The goblin spiders (Araneae, Oonopidae) of the Otonga Nature Reserve in the Chocó region of Ecuador are reviewed. A total of 1034 adult specimens were collected in 2014 and 23 morphospecies in eight different genera were identified from these collections. We describe seven new species: one in the genus *Niarchos* Platnick & Dupérré: *Niarchos normani* **sp. n.**; three in *Scaphidysderina* Platnick & Dupérré: *Scaphidysderina chirin* **sp. n.**, *S. lubanako* **sp. n.**, *S. tsaran* sp. n.; two in *Bipoonops* Bolzern: *Bipoonops lansa* **sp. n.**, *B. pilan* **sp. n.**; and one in *Reductoonops* Platnick & Berniker: *Reductoonops berun* **sp. n.** The males of *Niarchos baehrae* Platnick & Dupérré, 2010 and *Orchestina yanayacu* Izquierdo, 2017 are described here for the first time. Natural history and collecting data are given for all morphospecies collected, including *Niarchos barragani* Platnick & Dupérré, 2010, *Scaphidysderina cotopaxi* Platnick & Dupérré, 2011, *Scaphidysderina pinocchio* Platnick & Dupérré, 2011, *Orchestina otonga* Izquierdo, 2017, *Orchestina santodomingo* Izquierdo, 2017, *Orchestina truncata* Wunderlich, 2004, *Reductoonops otonga* Platnick & Berniker, 2014, *Reductoonops pichincha* Platnick & Berniker, 2014, *Paradysderina fusiscuta* Platnick & Dupérré, 2011, *Scaphiella pich* Platnick & Dupérré, 2010 and *Tinadyserina otonga* Platnick et al., 2013. The data show that oonopid spiders are a major element of the arachnofauna present in the Chocó neotropical forests.

Introduction

The goblin spiders (family Oonopidae) include 1747 species in 114 genera (World Spider Catalog 2017). The family was recently reviewed as part of the PBI Oonopidae, an extensive multinational research project. It appears that most species are found in tropical regions around the world (Jocqué and Dippenaar-Schoeman 2006; Ubick and Dupérré 2017). Oonopids are small (1.0–3.0 mm), two clawed, ecribellate, haplogyne spiders (Jocqué and Dippenaar-Schoeman 2006; Ubick and Dupérré 2017). Typically, oonopids have 2–6 eyes (the anterior median eyes are missing) (Jocqué and Dippenaar-Schoeman 2006; Ubick and Dupérré 2017), although some species are completely eyeless and live in caves (e.g. *Blanioonops patellaris, Cousinea keeleyi, Opopaea ectognophus*, *Wanops coecus*) (Simon and Fage 1922; Chamberlin and Ivie 1938; Saaristo 2001; Harvey and Edward 2007). Some others are habitat specialists, e.g those found in termite nests (e.g. *Anophthalmoonops, Caecoonops, Termitoonops*) (Benoit 1964, 1975, 1976). However, most Oonopids are nocturnal ground-dwellers that are found in diverse habitats such forests, deserts, and savannahs (Jocqué and Dippenaar-Schoeman 2006). Some genera are known to be arboreal in tropical forests and an important component of the canopy fauna (e. g. *Pescennina* and *Orchestina*) (Fannes et al. 2008; Henrard and Jocqué 2012; Platnick and Dupérré 2011b; Izquierdo and Ramírez 2017).

Morphologically, goblin spiders never cease to amaze. Strong sexual dimorphism has been observed in several genera: male clypeal horns or projections (e.g. *Unicorn*, some *Scaphidysderina*) (Platnick and Brescovit 1995; Platnick and Dupérré 2011a), male cheliceral projections (e.g. *Predatoroonops*, some *Scaphidysderina*) (Platnick and

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Dupérré 2011a; Brescovit et al. 2012b), male dorsal scutum on the abdomen absent or highly reduced in females (e.g. *Niarchos*, *Scaphydysderina*) (Platnick and Dupérré 2010b; Platnick and Dupérré 2011a), and modified leaf shaped setae on the labium and endites with hook shaped excrescences (e.g. some *Orchestina*) (Henrard and Jocqué 2012). Even more bizarre was the finding of palpal asymmetry between the left and right male palps (e.g. *Paradysderina*) (Platnick and Dupérré 2011c). This dimorphism is extreme and one may hypothesize different species from studying the pedipals alone. Some species also present mophological ant-mimicking modifications that enhance their antlike appearance, such as color patterns and constricted abdomen (e.g. *Antoonops* and *Pescennina*) (Fannes and Jocqué 2008; Platnick and Dupérré 2011b).

At the beginning of the Planetary Biodiversity Inventory in 2006, a total of 472 species were known in 67 genera. An additional 1275 species and 47 new genera were described since the project started, making it the 8th most speciose spider family so far following the hyperdiverse spider groups such as jumping spiders (Salticidae). This is a prime example of how studies with a primary taxonomic focus can make a major contribution to the documentation of life on Earth.

The present paper has two aims: First, we document and describe the biodiversity of goblin spiders found in the Chocó forests of Ecuador. Second, we provide ecological data and discuss the importance of Oonopid spiders in the neotropical cloud forests of this country.

Material and methods

We collected spiders in Otonga Nature Reserve, situated at 4.5 km from San Francisco de Las Pampas (00°25°S; -79°00°W) in the Cotopaxi Province, Ecuador. Otonga is composed of three types of habitats: a premontane evergreen forest ("bosque simpreverde piemontano") with an altitudinal range between 800–1300 m (Cerón 1999), a low evergreen montane forest ("bosque siempre verde montano bajo") between 1300–1800 m, and a cloud forest ("bosque de neblina montano") between 1800–3000 m (Valencia et al. 1999).

Four collecting trips were made: rain season (24–30 May 2014), end of the rain season (1–7 July 2014), middle of the dry season (7–13 September 2014), and beginning of the rain season (3–8 November 2014). Methods comprised beating and sweeping techniques, microhabitat collecting, litter sifting and Berlese funnels, and hand collecting. Five lines of ten pitfalls traps each were installed on the South side of the mountain: pitfall line 1 (00.41941°S, 78.99607°W) at 1717m; pitfall line 2 (00.41433°S, 79.00035°W) at 1888m; pitfall line 3 (00.41994°S, 79.00623°W) at 1997 m; pitfall line 4 (00.41564°S, 79.00425°W) at 2105m; pitfall line 5 (00.42261°S, 79.5107°W) at 2225 m. Another five lines of ten pitfalls traps were also installed on the North side of the mountain, Las Damas (00.39506°S, 78.98100°W) at 1209 m. The pitfalls ran from May until September 2014 and were recovered every 10–12 days. Matching males and females in some congeneric species is sometimes uncertain, consequently males and females were matched on the base of several criteria: 1) collected together, 2) size and colour, 3) abundance.

Material examined is deposited in the following institutions: AMNH, American Museum of Natural History New York, NY, USA; DTC, Dupérré-Tapia Collection, Fundación OTONGA, Quito, Ecuador; QCAZ, Museum of Invertebrates, Pontificia Universidad Católica, Quito, Ecuador; ZMH, Zoological Museum Hamburg, Universität of Hamburg, Germany. Specimens were examined in 70% ethanol under a SMZ-U Nikon dissection microscope. A Nikon Coolpix 950 digital camera attached to the microscope was used to photograph all the structures to be illustrated. The digital photos were used as a template to draw the structures. Female genitalia were excised using a sharp entomological needle placed on a slide in lactic acid and observed under an AmScope XSG Series T-500 compound microscope. All measurements are expressed in millimeters and were taken using a micrometric ruler on the microscope. Photos were taken with a BK Plus Lab System by Dun, Inc. with a Canon 5DS Macro camera and a Canon 65mm lens. Morphological nomenclature follows: Platnick and Dupérré (2010b, 2011a); Bolzern (2014); Platnick and Berniker (2014).

Abbreviations

Somatic morphology: ALE: anterior lateral eye; LE: lateral eye; PLE: posterior lateral eye; PME: posterior median eye. Genitalia of females: a: atrium; agp: anterior gentialic process; app: apodemic projection; d: duct; pgp: posterior gentialic process.

Genitalia of males: c: conductor; dap1: (dorsal apophysis 1); dap2: (dorsal apophysis 2); e: embolus; bp: basal process; dp: dorsal process; plp: prolateral process process of conductor; rlp: retrolateral process of conductor; vap: ventral apophysis.

Results

A total of 1034 adult specimens were collected which comprised 23 morphospecies in eight different genera. One morphospecies could not be fitted into any of the extisting genera and probably belongs to an undescribed genus. Previous results of this study presented by Dupérré and Tapia (2016) showed that Oonopidae is the second most diverse family after Theridiidae (32 morphospecies), alongside the Tetragnathidae (22 morphospecies) and Linyphiidae (22 morphospecies). Oonopidae is the most abundant family ~27% of the total spider abundance found in the neotropical forests of the Chocó region of Ecuador (Dupérré and Tapia 2016). Among oonopids, results show that *Scaphidysderina* is the most abundant genus (329 specimens), followed by *Niarchos* (221 specimens), *Tinadysderina* (135 specimens), and *Paradysderina* (115 specimens).

Taxonomy

Family Oonopidae Simon, 1890

Genus *Niarchos* Platnick & Dupérré, 2010

Type species. *Niarchos cotopaxi* Platnick & Dupérré, 2010.

Diagnosis. Dorsal abdominal scutum present in males, absent in females; posterior eyes reduced in size; male palp with wide cymbium without distinct delimitation from the palpal bulb; male endites with posteriorly or externally directed anterior projections (Platnick and Dupérré 2010: 6).

Composition and distribution. Twenty-three species distributed in the Andean regions of Colombia, Ecuador and Peru (Platnick and Dupérré 2010).

Niarchos normani sp. n.

http://zoobank.org/F5DE4FE2-409E-4AA1-BA28-DB2DC1872069
Figs 1, 2, 30

Type material. Male holotype from Ecuador, Cotopaxi province, OTONGA Biological Reserve, 21.vi.2014, sifting moss, Berlese, E. Tapia, C. Tapia, N. Dupérré (QCAZ).

Etymology. In honor of Dr. Norman Platnick, curator emeritus at the American Museum of Natural History, for his innovative and comprehensive work on the spider family Oonopidae.

Diagnosis. This species most resemble *Niarchos palenque* Platnick & Dupérré, 2010, but differs from all species of the genus by the horizontally directed anterior projections of the male endites (Fig. 2) and the general appearance of the bulb (Fig. 1)

Description. Male (holotype). Total length: 1.8; carapace length: 1.3; carapace width: 0.9.

COLORATION: Carapace orange (Fig. 30); sternum, chelicerae, endites, labium, legs, and palpi pale orange; dorsal and ventral scuta pale orange (Fig. 30); soft portions of abdomen white. CEPHALOTHORAX: Elongate oval in dorsal view (Fig. 30); pars cephalica slightly elevated in lateral view, surface of elevated portion of pars cephalica smooth, sides finely reticulate; fovea absent. Clypeus margin slightly rebordered, vertical in lateral view. Sternum longer than wide, surface smooth. Labium triangular, not fused to sternum, anterior margin not indented at middle (Fig. 2). Endites distally not excavated, anteromedian tip with bidentate externally directed projections (Fig. 2). Chelicerae straight; without teeth. EYES: Six eyes; reduced in size, ALE much larger than posterior eyes; all eyes oval; posterior eye row recurved from above; PLE-PME touching; ALE touching, ALE-PLE touching, PME touching. LEGS: Leg formula 4123; leg spination: tibiae IV v0-0-1p. ABDOMEN: Without color pattern, cylindrical; book lung covers large; posterior spiracles connected by groove; dorsal scutum present, strongly sclerotized, without color pattern, covering most of dorsum but not fused to epigastric scutum, surface finely reticulate; epigastric scutum strongly sclerotized, surrounding pedicel, fused to long, strongly sclerotized postepigastric scutum, postepigastric scutum occupying most of the venter; supraanal scutum absent; spinneret scutum reduced. GENITALIA: Male palp not strongly sclerotized; cymbium ovoid in dorsal view, completely fused with bulb; bulb elongated; embolus wide, sclerotized accompanied by a translucent distal portion (Fig. 1).

Female. Unknown.

Distribution. Only known from the type locality.

Note. The species belongs to the *palenque*-group Platnick & Dupérré, 2010, based on the bipartite embolar region with a sclerotized basal embolus and a translucent distal portion.

Niarchos baehrae Platnick & Dupérré, 2010

Figs 3, 4

Female, Platnick and Dupérré (2010: figs 134–143).

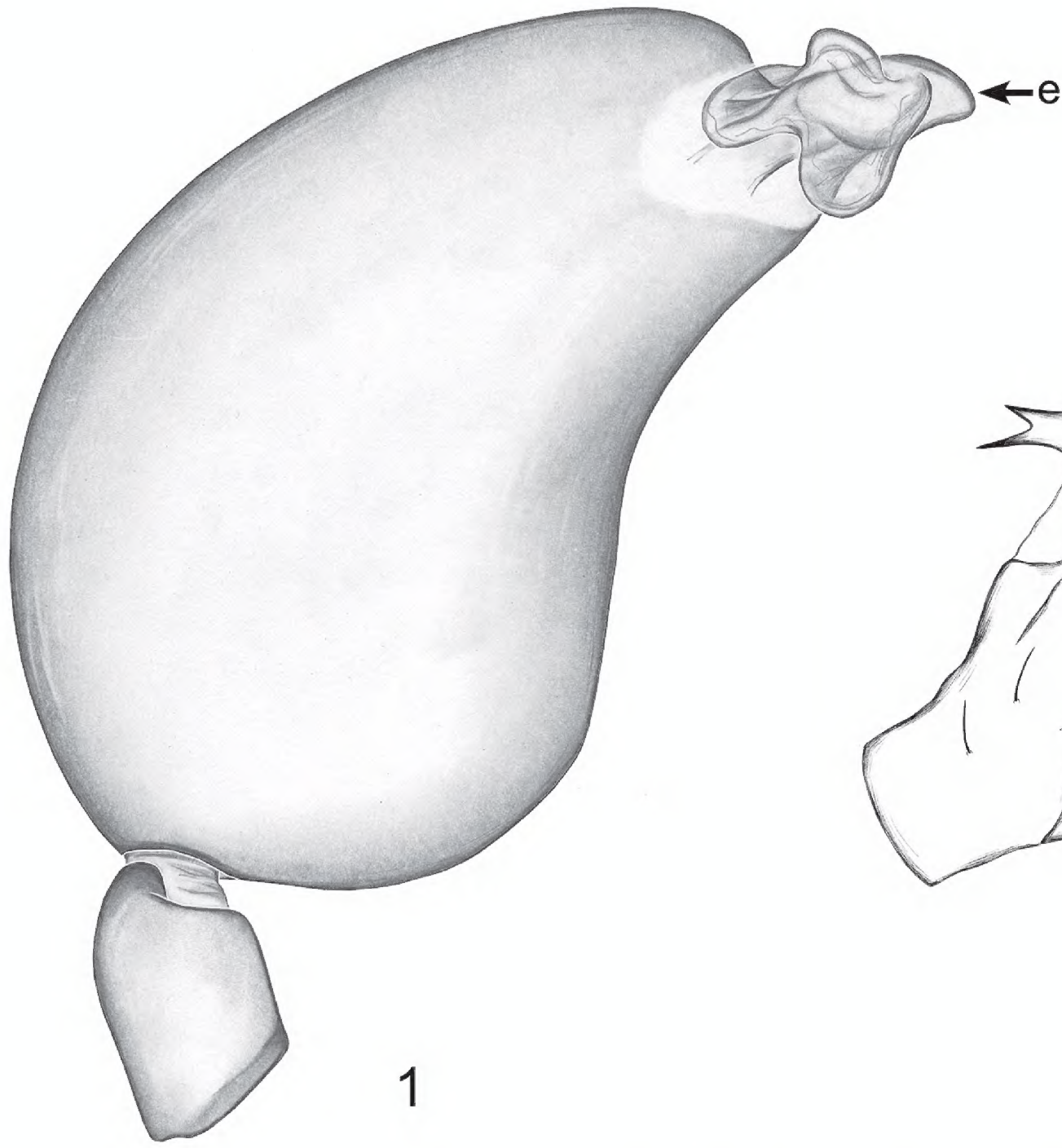
Type material. Female holotype from Ecuador, Cotopaxi Province, OTONGA Biological Reserve (0°25'11"S, 78°59'41"W) 1625m, 08.xii.2009, hand collecting from forest litter, B. Baehr, Niarchos Exped., (QCAZ PBI_OON 429). NOT EXAMINED.

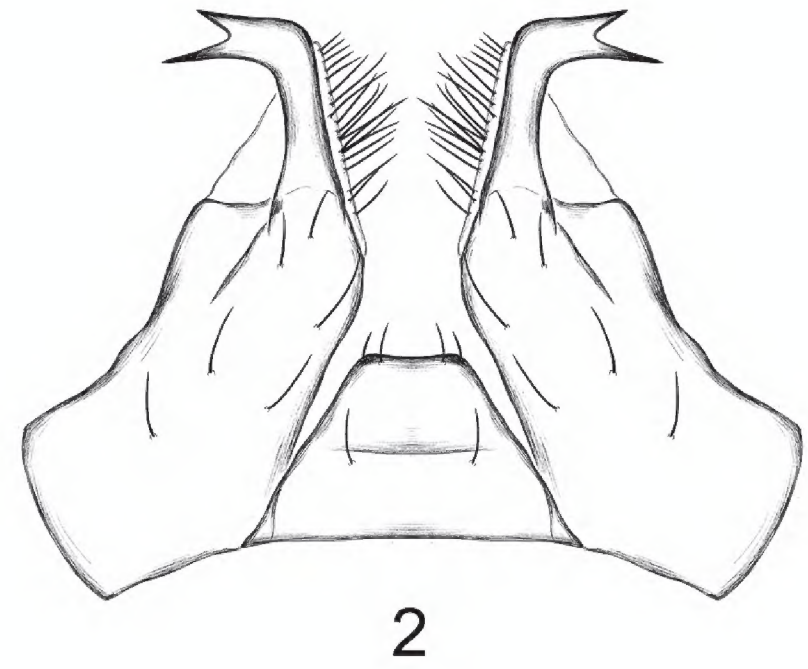
New records. ECUADOR: *Cotopaxi Province*: OTONGA Biological Reserve, 08–21.vi.2014, 2♂1♀, sifting moss, Berlese, E. Tapia, C. Tapia, N. Dupérré (DTC); 04–07.ix.2104, 4♂, sifting litter, Berlese, E. Tapia, C. Tapia, N. Dupérré (ZMH); OTONGA Biological Reserve (00.41941°S, 78.99607°W) 1717m, 24–30.v.2014, 2♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); OTONGA Biological Reserve (00.41433°S, 79.00035°W) 1888m, 03–16.viii.2014, 4♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (DTC); 16.viii–05.ix.2014, 2♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); OTONGA Biological Reserve (00.41994°S, 79.00623°W) 1997m, 16.viii. –05.ix.2014, 5♂1♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (QCAZ); 13–25.xi.2014, 1♂1♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 25.xi.–08.xii. 2014, 2♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); OTONGA Biological Reserve (00.41994°S, 79.00623°W) 2105m, 03–16.viii.2014, 6♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 13–25.xi.2014, 1♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); OTONGA Biological Reserve (00.41564°S, 79.00425°W) 2225m, 16.viii–05.ix.2014, 2♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 16.viii–05.ix.2014, 10♂4♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (AMNH).

Diagnosis of male. Males are distinguished from most species by the large up-right embolus accompanied by two dark projections (Fig. 3); and from *Niarchos loja* Platnick & Dupérré, 2010 by the small triangular sclerotization located at the prolateral base of the embolus (Fig. 3).

Description. Male. Total length: 2.1; carapace length: 1.4; carapace width: 1.0.

COLORATION: Carapace orange; sternum, chelicerae, endites, labium, legs, and palpi pale orange; dorsal





Figures 1–2. *Niarchos normani* sp. n., male. **1.** Palp, prolateral view. **2.** Labium and endites, ventral view.

and ventral scuta pale orange, soft portions of abdomen white. CEPHALOTHORAX: Carapace without any pattern, elongate oval in dorsal view; pars cephalica slightly elevated in lateral view, entire surface with low granulation; fovea absent. Clypeus margin slightly rebordered, vertical in lateral view. Sternum longer than wide, surface finely reticulate, microsculpture covering entire surface. Labium triangular, not fused to sternum, anterior margin indented at middle (Fig. 4). Endites distally not excavated, anteromedian tip with recurved, posteriorly directed triangular projection (Fig. 4). Chelicerae straight; without teeth. EYES: Six; reduced in size, ALE much larger than posterior eyes; all eyes oval; posterior eye row recurved from above; PLE-PME touching; ALE touching; ALE-PLE touching; PME touching.

LEGS: Leg formula: 4123; leg spination: tibiae IV v0-0-1p. ABDOMEN: Cylindrical; book lung covers large; posterior spiracles connected by groove; dorsal scutum present, strongly sclerotized, covering most of dorsum but not fused to epigastric scutum, surface finely reticulate; epigastric scutum strongly sclerotized, surrounding pedicel, fused to long, strongly sclerotized postepigastric scutum; postepigastric scutum occupying most of the venter; supraanal scutum absent; spinneret scutum reduced. GENITALIA: Male palp not strongly sclerotized; cymbium ovoid in dorsal view, completely fused with bulb; bulb elongated; embolus dark, accompanied by two dark pointed projections, one basal and one apical (Fig. 3).

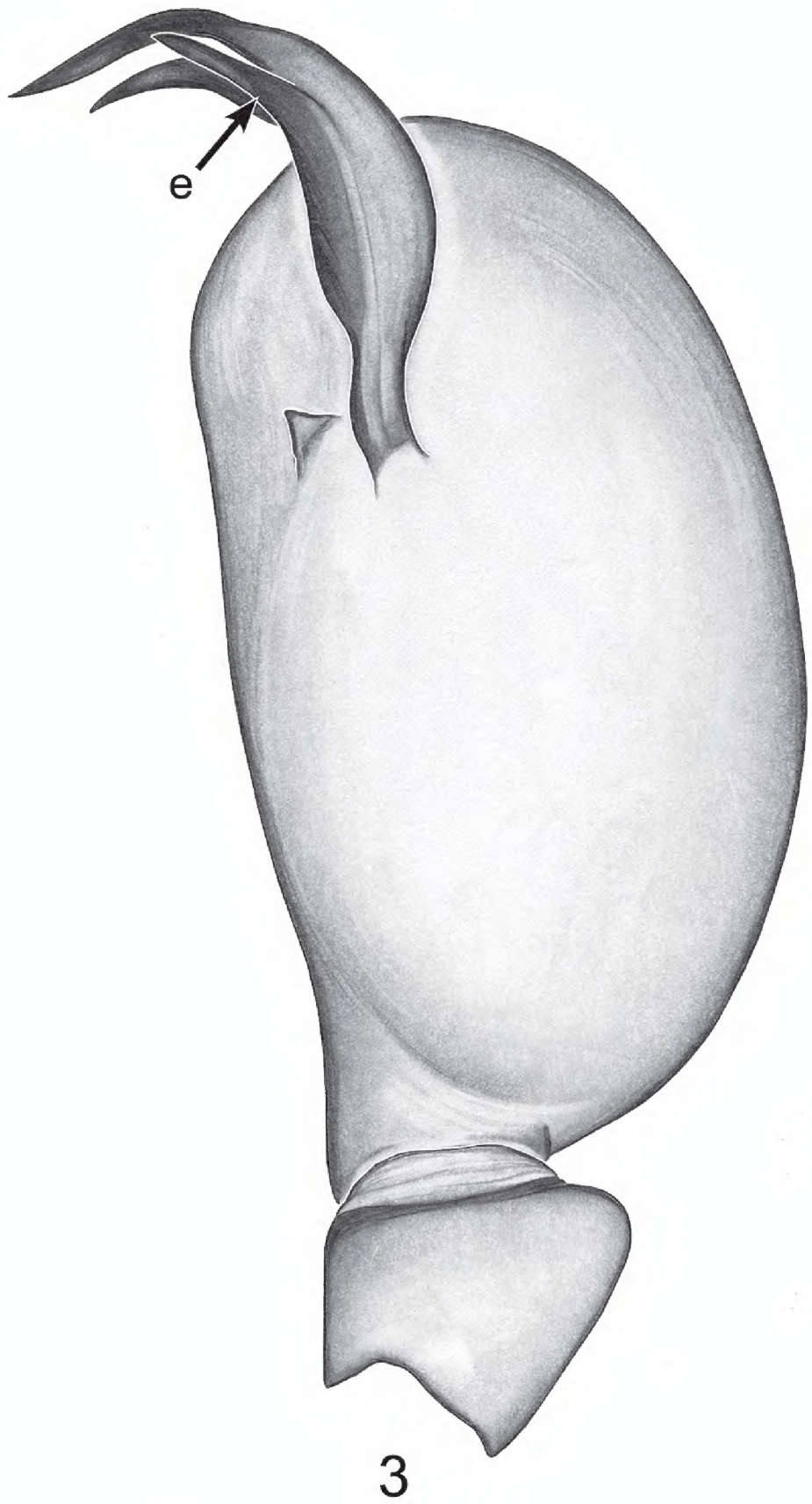
Natural history. All specimens were collected between 1625 and 2225m, by pitfall or sifting mosses and litter.

Distribution. Only known from the type locality.

Note. In Platnick and Dupérré (2010), *Niarchos baehrae* was placed in the *cotopaxi*-group based on the female genitalic features (globose, tentlike anterior receptaculum). In light of the discovery of the male, we proposed that the species belongs in the *loja*-group instead. The males of *Niarchos baehrae* does not share the characteristic retroventral projection of the palpal bulb, but an elongated embolus originating distally on the bulb and protruding far beyond the bulb, characteristic of the male of the *loja*-group.

Niarchos barragani Platnick & Dupérré, 2010

New records. ECUADOR: *Cotopaxi Province*: OTONGA Biological Reserve, 24–30.v.2014, 18♂2♀, sifting litter, Berlese, E. Tapia, C. Tapia, N. Dupérré (ZMH); 08–21.vi.2014, 4♂2♀, sifting litter, Berlese, E. Tapia, C.



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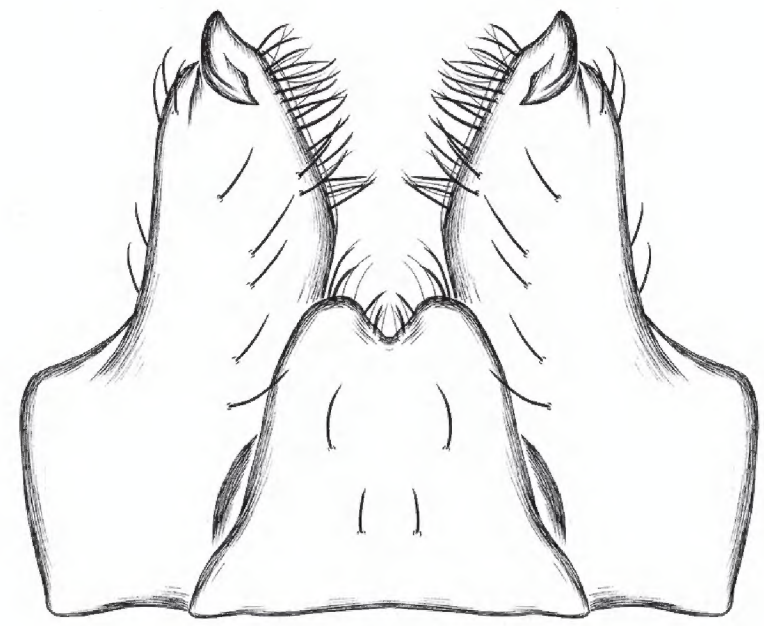

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Figures 3–4. *Niarchos baehrae* Platnick & Dupérré, 2010, male **3.** Palp, ventral view. **4.** Labium and endites, ventral view.

Tapia, N. Dupérré (QCAZ); 04–07.ix.2014, 10♂4♀, sifting litter, Berlese, E. Tapia, C. Tapia, N. Dupérré (ZMH); (00.41941°S, 78.99607°W) 1717m, 24-30.v.2014, 1♂1♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 03–16.viii.2014, 1♂1♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); (00.41438°S, 79.00035°W) 1888m, 03–16.viii.2014, 7♂2♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); (00.41994°S, 79.00623°W) 1997m, 16.viii.05.ix.2014, 19♂25#, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 13–25.xi.2014, 11♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 25.xi. –08.xii.2014, 4♂2♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (DTC); (00.41564°S, 79.00425°W) 2105m, 03–16.viii.2014, 16♂4♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (DTC); 03–16.viii.2014, 9♂6♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (AMNH); 13–25.xi.2014, 4♂1♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); (00.42261°S, 79.5107°W) 2225m, 13–25.xi.2014, 10♂1♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH).

Natural history. In our study specimens were collected between 1717 and 2225m. Previous records from Platnick and Dupérré (2010) suggest that the species occur from 700m to 2150m.

Distribution. Pichincha and Cotopaxi Provinces (Ecuador).

Genus *Scaphidysderina* Platnick & Dupérré, 2011

Type species. *Scaphidysderina palenque* Platnick & Dupérré, 2011.

Diagnosis. Highly crenulated sternum; lacking spinneret scutum and a groove connecting either the anterior or posterior spiracles (Platnick and Dupérré 2011: 5).

Composition and distribution. Twenty species distributed across Colombia, Ecuador and Peru.

Scaphidysderina chirin sp. n.

http://zoobank.org/38AAD407-F1E0-4B95-AFDF-3DD863F6C625
Figs 5–8

Type material. Male holotype and female allotype from Ecuador, Cotopaxi Province, OTONGA Biological Reserve, Las Damas (00.39506°S, 78.98100°W) 1209m, 16.viii.–03.ix.2014, pitfall, E. Tapia, C. Tapia, N. Dupérré (QCAZ). Paratypes from Ecuador, Cotopaxi Province OTONGA Biological Reserve, Las Damas (00.39506°S, 78.98100°W) 1209m, 28.vi.–12.vii.2014, 21♂19♀, pitfall (ZMH).

Additional material. ECUADOR: *Cotopaxi Province*: OTONGA Biological Reserve, Las Damas (00.39506°S, 78.98100°W) 1209m, 28.vi.–12.vii.2014, 3♂2♀, sifting litter with Berlese extraction, E. Tapia, C. Tapia, N. Dupérré (DTC); 12–23.vii.2014, 21♂13♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 23.vii–03.viii.2014, 9♂12♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 05–16.viii.2014, 10♂8♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 16.viii. –03.ix.2014, 20♂12♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); (00.41941°S, 78.99606°W) 1717m, 24.v.–08.vii.2014, 4♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); (00.41433°S, 79.0035°W) 1888m, 21.v.–12.vii.2014, 1♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 03–16.viii.2014, 7♂2♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (AMNH); 16.viii.–05.ix.2014, 16♂4♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (QCAZ); 13–25.xi.2014, 1♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 25.xi.–08.xii.2014, 3♂1♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (DTC).

Etymology. The specific epithet is a noun in apposition taken from the Tsafi´ki languange, meaning "narrow" for the slender male palpal bulb.

Diagnosis. Males are distinguished by their short, twisted basal process of the embolus (Fig. 5). Females are distinguished by the T-shaped anterior genitalic process (Fig. 8) and from *S. tsaran* sp. n. by the more externally positioned apodemic projections (Fig. 8).

Description. Male (holotype). Total length: 2.2; carapace length: 1.1; carapace width: 0.9.

COLORATION: Carapace and sternum red-brown; mouthparts orange-brown; abdominal scuta red-brown, abdominal soft portions white; legs orange-brown. CARAPACE : Carapace broadly oval; covered with low tubercles surrounded by U-shaped smooth area; fovea absent. Clypeus margin rebordered, with median projection. Sternum wider than long, not fused to carapace, surface highly crenulated. Chelicerae slightly divergent, anterior face with swelling; with one promarginal tooth and dorsally directed spine (Fig. 6). Labium triangular, not fused to sternum, anterior margin indented at middle. Endites distally excavated, with short ventral and longer dorsal processes. EYES: Six, well developed; ALE largest, ALE oval, PME squared, PLE oval; posterior eye row straight in dorsal view; ALE separated by their radius, ALE-PLE touching, PME touching, PLE-PME touching. LEG: Leg formula: 4123; leg spination: Tibiae I v2-2-2-2-2; metatarsi I v2-2-2; tibiae II v2-2-2-2-2; metatarsi II v2-2-2. ABDOMEN: Ovoid; book lung covers large, ovoid; posterior spiracles not connected by groove; dorsal scutum present, strongly sclerotized, not fused to epigastric scutum, entirely smooth; epigastric scutum strongly sclerotized, surrounding pedicel, not protruding; postepigastric scutum strongly sclerotized, almost semicircular, fused to epigastric scutum; spinneret scutum absent, supraanal scutum absent. GENITALIA: Cymbium and bulb yellow, fused; bulb elongated oval, pointed apically (Fig. 5); embolus dark basally, transparent and pointed apically, with small twisted basal projection (Fig. 5).

Female. Total length: 3.1; carapace length: 1.3; carapace width: 1.0.

COLORATION: As in male. CARAPACE: As in male. Clypeus margin rebordered, with small median projection. Sternum as in male. Chelicerae not divergent, without swelling; with one promarginal tooth. Labium triangular, not fused to sternum, anterior margin indented at middle. Endites distally not excavated. EYES: As in male. LEG: As in male. Palp without claw. ABDOMEN: Ovoid; book lung covers large, ovoid; posterior spiracles not connected by groove; dorsal scutum absent, postepigastric scutum strongly sclerotized, almost semicircular, fused to epigastric scutum; spinneret scutum absent, supraanal scutum absent. GENITALIA: Atrium oval; epigastric scutum with an X-shaped marking (internal genitalia visible by transparence) (Fig. 7); internal genitalia with T-shaped anterior genitalic process and short apodemes with externally positioned pointed projections (Fig. 8).

Natural history. All specimens were collected between 1209 and 1888m. Most specimens were collected from mid-June to mid-July, and mid-August to early September.

Distribution. Only known from the type locality.

Scaphidysderina lubanako sp. n.

http://zoobank.org/486F018D-50D0-42FE-8782-E82B593FA1CD
Figs 9–12, 31–33

Type material. Male holotype and female allotype from Ecuador, Cotopaxi Province, OTONGA Biological Reserve, Las Damas (00.39596°S, 79.98100°W) 1209m, 28.vi.–12.vii.2014, pitfall, E. Tapia, N. Dupérré (QCAZ). Paratypes from OTONGA Biological Reserve, Las Damas (00.39596°S, 79.98100°W) 1209m, 28.vi.–12.vii.2014, 3♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH)

Additional material. ECUADOR: *Cotopaxi Province*: OTONGA Biological Reserve, (00.41433°S, 79.00035°W) 1888m, 08–21.vi.2014, 2♂2♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (DTC); 16.viii.–05.ix.2014, 1♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); (00.41994°S, 79.00623°W) 1997m, 08–21.vi.2014, 2♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 03–16.viii.2014, 1♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH);16.viii.–05.ix.2014, 1♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 05–19.ix.2014, 1♂1♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (AMNH); 04–07.ix.2014, 3♂, sifting litter, E. Tapia, C. Tapia, N. Dupérré (AMNH);

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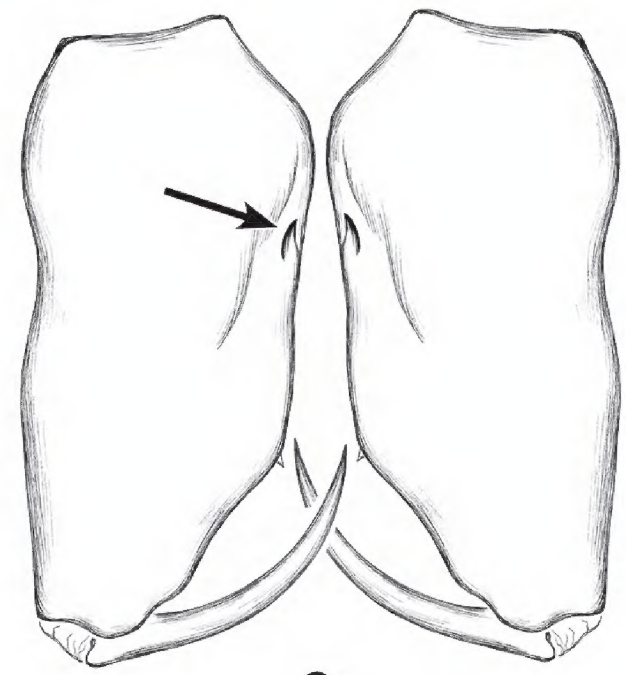

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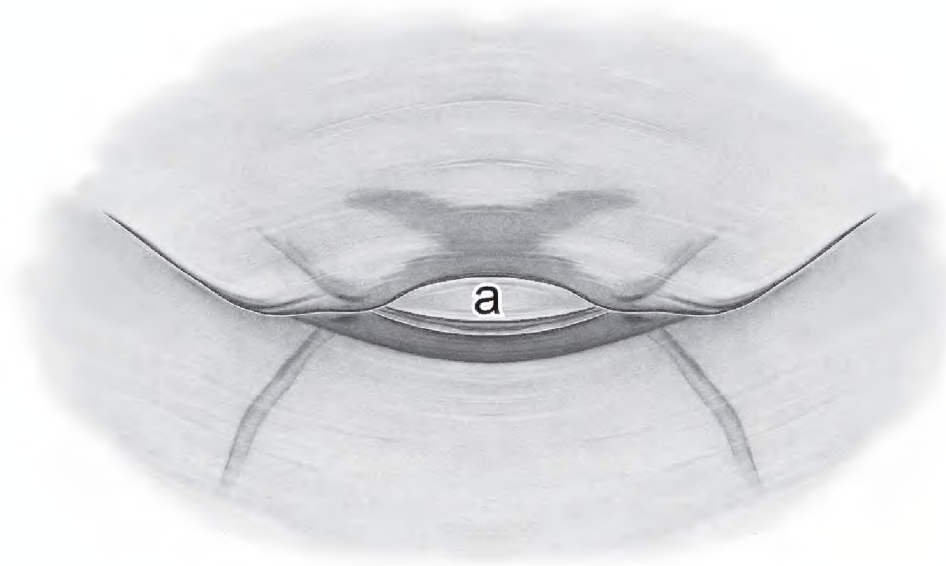

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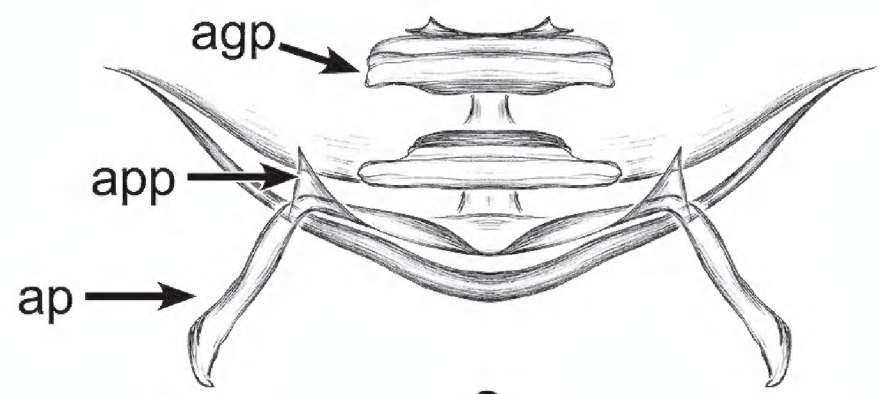

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Figures 5–8. *Scaphidysderina chirin* sp. n. Male (**5, 6**). Female (**7, 8**). **5.** Palp, ventral view. **6.** Chelicerae, anterior view. **7.** Epigynal region, ventral view. **8.** Internal genitalia, dorsal view.

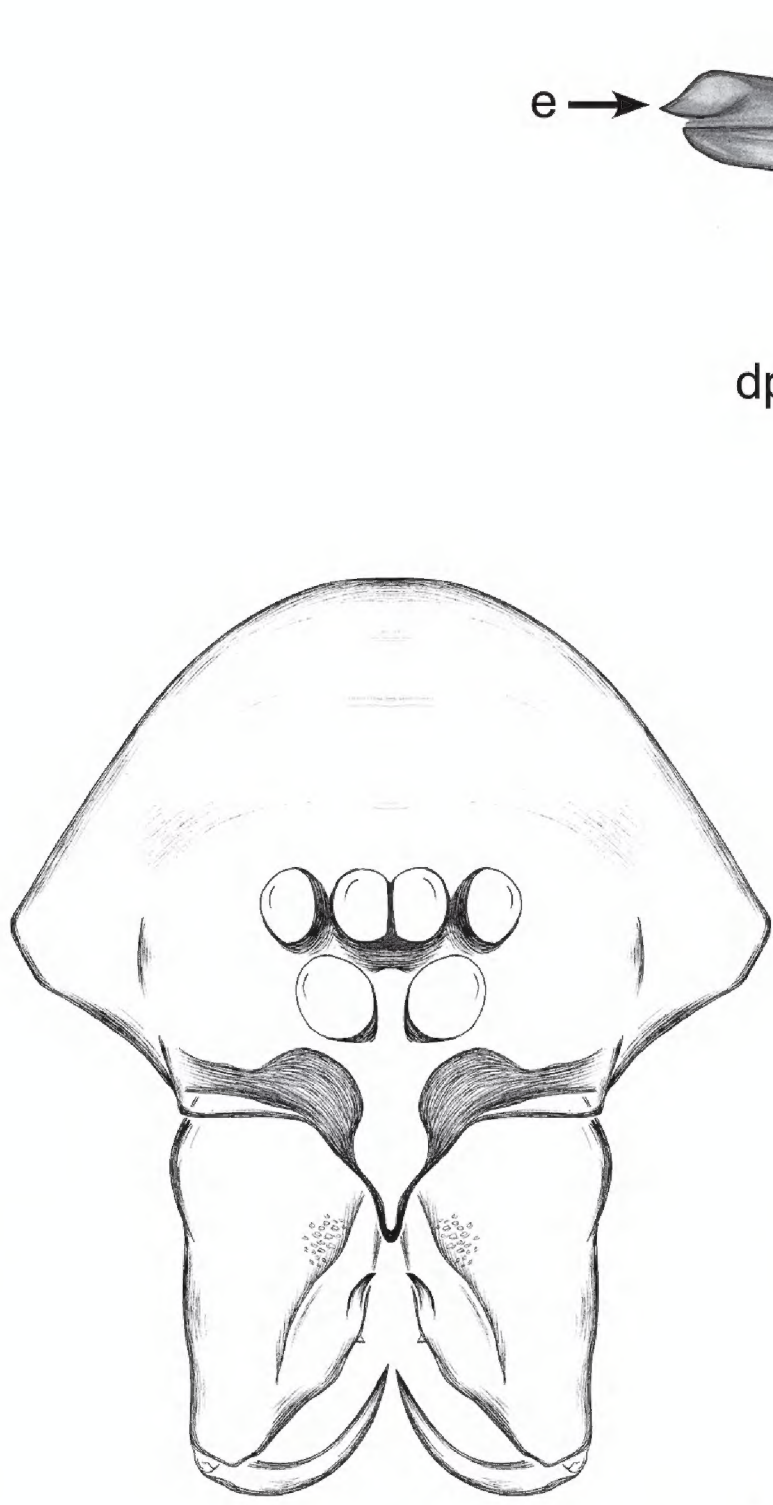
13–25.xi.2014, 1♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (DTC); 25.xi.–08.xii.2014, 3♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (QCAZ).

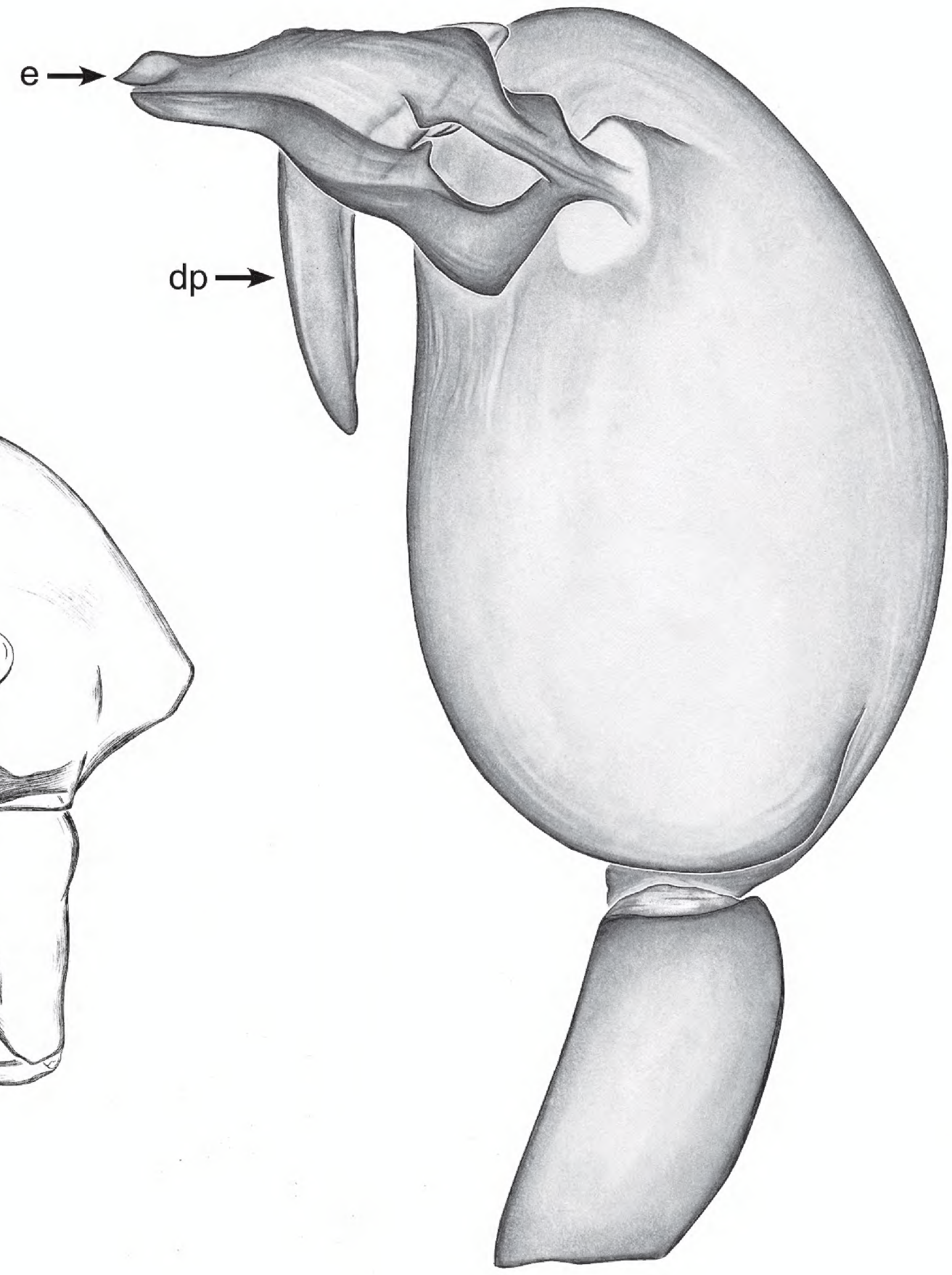
Etymology. The specific epithet is a noun in apposition taken from the Tsafi´ki languange, meaning 'red devil'.

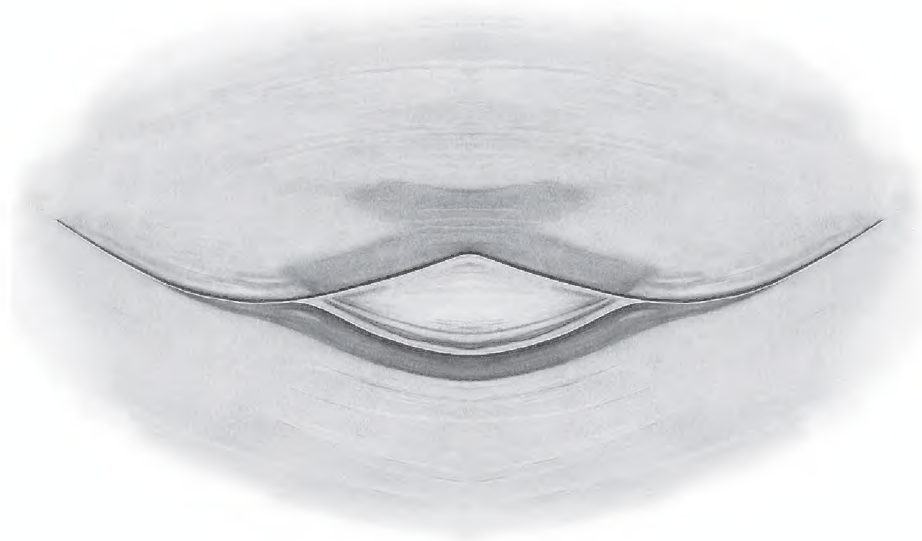
Diagnosis. Males are distinguished from all species by their very long dorsal, basally pointing embolic process (Fig. 10). Females are distinguished by their X-shaped anterior genitalic process of the internal genitalia (Fig. 12), from *S. tandapi* Platnick & Dupérré, 2011 by the more centrally positioned apodemic projections (Fig. 12); more externally positioned in the later species (Platnick and Dupérré 2011; figs 222, 223).

Description. Male (holotype). Total length: 2.3; carapace length: 1.4; carapace width: 1.1.

COLORATION: Carapace and sternum reddish (Figs 31, 32); mouthparts orange-brown; abdominal scuta reddish, abdominal soft portions white; legs red-orange (Figs 31, 32).







Figures 9–12. *Scaphidysderina lubanako* sp. n. Male (**9, 10**). Female (**11, 12**). **9.** Carapace, anterior view. **10.** Palp, ventral view. **11.** Epigynal region, ventral view. **12.** Internal genitalia, dorsal view.

CARAPACE: Carapace broadly oval; covered with low tubercles; fovea absent (Fig. 32). Clypeus margin rebordered, elongated median projection present (Fig. 9). Sternum wider than long, not fused to carapace, surface highly crenulated. Chelicerae slightly divergent, anterior face with swelling; with one promarginal tooth and dorsally directed spine (Figs 9, 31). Labium triangular, not fused to sternum, anterior margin indented at middle. Endites distally excavated, with a short ventral, and a longer dorsal processes. EYES: Six, well developed; ALE largest, oval, PME squared, PLE oval; posterior eye row straight in dorsal view; ALE separated by their radius, ALE-PLE touching, PME touching, PLE-PME touching. LEG: Leg formula: 4123; leg spination: Tibiae I v2-2-2-2-2; metatarsi I v2-2-2; tibiae II v2-2-2-2-2; metatarsi II v2-2-2. ABDOMEN: Ovoid; book lung covers large, ovoid; posterior spiracles not connected by groove; dorsal scutum present, strongly sclerotized, not fused to epigastric scutum, entirely smooth; epigastric scutum strongly sclerotized, surrounding pedicel, not protruding; postepigastric scutum strongly sclerotized, almost semicircular, fused to epigastric scutum; spinneret scutum absent, supraanal scutum absent. GENITALIA: Cymbium yellow; bulb yellow, oval, rounded apically; embolus large, small point apically, with large angular basal projection and dorsal, basally pointing projection (Fig. 10).

Female. Total length: 2.9; carapace length: 1.3; carapace width: 1.1.

COLORATION: As in male, except abdomen withish (Fig. 33). CARAPACE: As in male. Clypeus margin rebordered, with small median projection. Sternum as in male. Chelicerae not divergent, without swelling; with one promarginal tooth. Labium triangular, not fused to sternum, anterior margin deeply indented medially. Endites not excavated. EYES: As in male. LEG: As in male. Female palpal claw absent. ABDOMEN: Ovoid; book lung covers large, ovoid; posterior spiracles not connected by groove; dorsal scutum absent (Fig. 33); postepigastric scutum strongly sclerotized, almost semicircular, fused to epigastric scutum; spinneret scutum absent, supraanal scutum absent. GENITALIA: Atrium trianglular; epigastric scutum with see through X-shaped mark (Fig. 11); epigastric scutum with an X-shaped marking (internal genitalia visible by transparence); apodemes long with internally positioned small, triangular projections (Fig. 12).

Natural history. All specimens were collected between 1209 and 1997m.

Distribution. Only known from the type locality.

Scaphidysderina tsaran sp. n.

http://zoobank.org/AAFDFA9B-049E-41D2-96F2-DD13503099D0

Figs 13–17

Type material. Male holotype and female allotype from Ecuador, Cotopaxi Province, OTONGA Biological Reserve, (00.41564°S, 79.00425°W) 2105m, 24.v.–08.vi.2014, pitfall, E. Tapia, C. Tapia, N. Dupérré (QCAZ). Paratypes from Ecuador, Cotopaxi Province, OTONGA Biological Reserve, (00.42261°S, 79.00425°W) 2225m 16.viii.–05.ix.2014, 27♂5♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH).

Additional material. *Cotopaxi Province*: OTONGA Biological Reserve (00.41994°S, 79.00623°W) 1997m, 08–21.vi.2014, 1♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); (00.41564°S, 79.5107°W) 2105m, 08–21.vi.2014, 10♂4♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 21.vi.–02.vii.2014, 9♂9♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (QCAZ); 13–25.xi.2014, 7♂1♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (QCAZ); 25.xi.–08.xii.2014, 4♂3♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); (00.42261°S, 79.00425°W) 2225m, 24.v.–08.vi.2014, 14♂7♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (AMNH); 08–21.vi.2014, 4♂2♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (DTC); 03–16.viii.2014, 19♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 13–25.xi.2014, 13♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 25.xi.–08.xii.2014, 11♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH).

Etymology. The specific epithet is a noun in apposition taken from the Tsafi´ki languange, meaning ‘beautiful’.

Diagnosis. Males are distinguished from all species by their spine-like embolic basal process (Fig. 13). Females are distinguished by their T-shaped anterior genitalic process (Fig. 17), and from *S. chirin* sp. n. by the very elongated of apodemic projections (Fig. 17).

Description. Male (holotype). Total length: 2.2; carapace length: 1.4; carapace width: 1.0.

COLORATION: Carapace and sternum red-brown; mouthparts orange-brown; abdominal scuta red-brown, abdominal soft portions white; legs orange-brown. CARAPACE: Carapace broadly oval; covered with low tubercles surrounded by U-shaped smooth area; fovea absent. Clypeus margin rebordered, without median projection. Sternum wider than long, not fused to carapace, surface highly crenulated (Fig. 15). Chelicerae slightly divergent, anterior face with swelling; with one promarginal tooth and dorsally directed spine (Fig. 14). Labium triangular, not fused to sternum, anterior margin deeply indented at middle. Endites distally excavated, with short ventral and longer dorsal processes. EYES : Eyes six, well developed; ALE largest, ALE oval, PME squared, PLE oval; posterior eye row straight in dorsal view; ALE separated by their radius, ALE-PLE touching, PME touching, PLE-PME touching. LEG: Leg formula: 4123; leg spination: Tibiae I v2-2-2-2-2; metatarsi I v2-2-2; tibia II v2-2-2-2-2; metatarsi II v2-2-2. ABDOMEN: Ovoid; book lung covers large, ovoid; posterior spiracles not connected by groove; dorsal scutum present, strongly sclerotized, not fused to epigastric scutum, entirely smooth; epigastric scutum strongly sclerotized, surrounding pedicel, not protruding; postepigastric scutum strongly sclerotized, almost semicircular, fused to epigastric scutum; spinneret scutum absent, supraanal scutum absent. GENITALIA: Cymbium yellow; bulb yellow, elongated oval, round-

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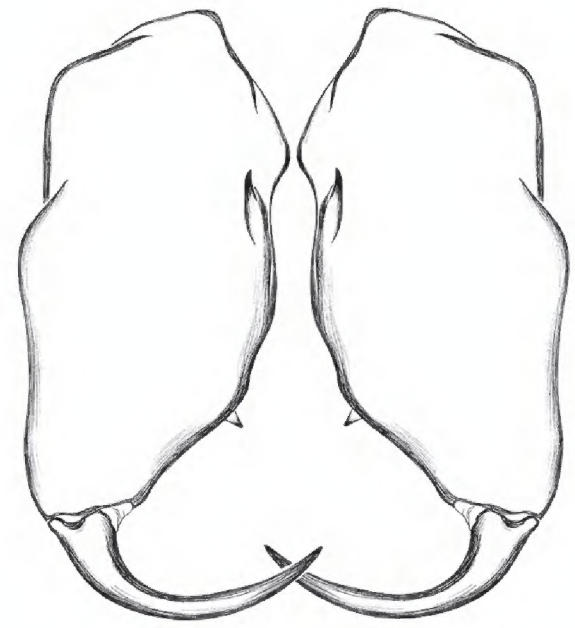

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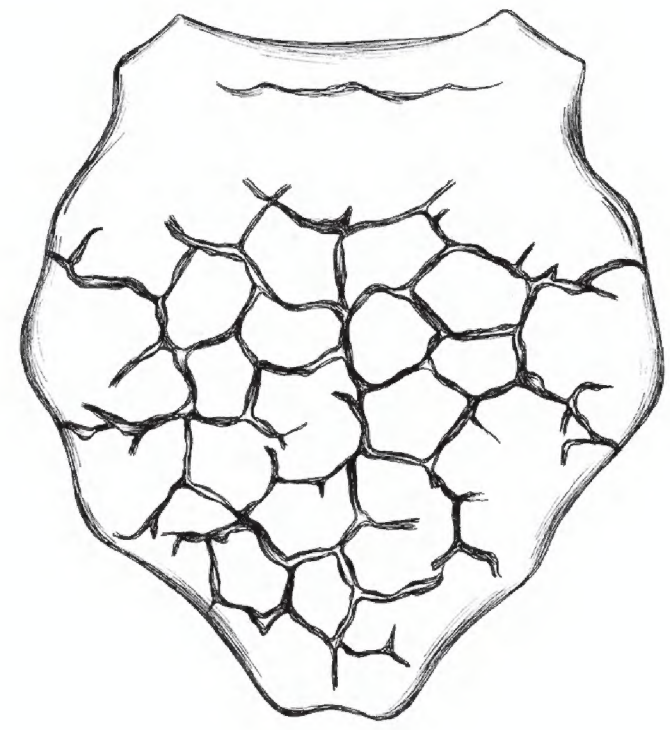

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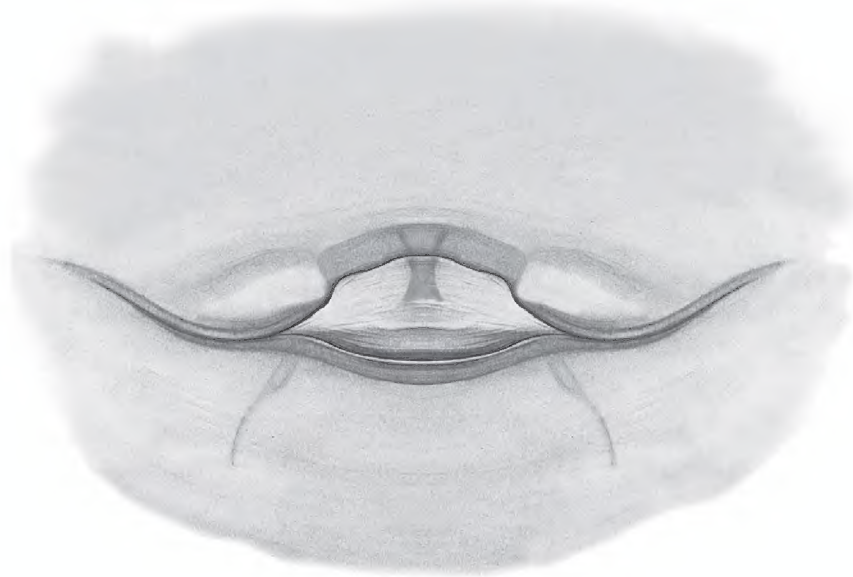

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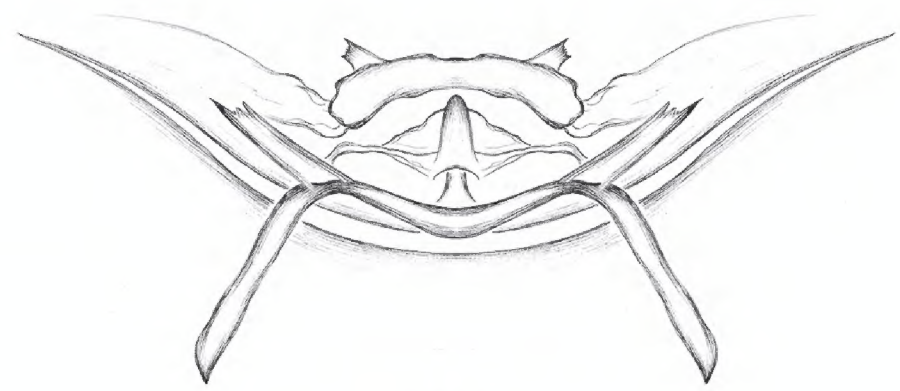

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Figures 13–17. *Scaphidysderina tsaran* sp. n. Male (**13–15**). Female (**16, 17**). **13.** Palp, ventral view. **14.** Chelicerae, anterior view. **15.** Sternum, ventral view. **16.** Epigynal region, ventral view. **17.** Internal genitalia, dorsal view.

ed apically; embolus dark, pointed apically, with small spine-like basal projection (Fig. 13).

Female. Total length: 3.0; carapace length: 1.4; carapace width: 1.1.

COLORATION: As in male. CARAPACE: As in male. Clypeus margin rebordered, with small median projection. Sternum as in male. Chelicerae not divergent, without swelling; with one promarginal tooth. Labium triangular, not fused to sternum, anterior margin deeply indented at middle. Endites distally not excavated. EYES: As in male. LEG: As in male. Palpal claw absent. ABDOMEN: Ovoid; book lung covers large, ovoid; posterior spiracles not connected by groove; dorsal scutum absent; postepigastric scutum strongly sclerotized, almost semicircular, fused to epigastric scutum; spinneret scutum absent, supraanal scutum absent. GENITALIA: Atrium trapezoidal (Fig. 16); internal genitalia with T-shaped anterior genitalic process; apodemes long with large, externally located projections (Fig. 17).

Natural history. All specimens except one were collected between 2105–2225m, predominantly from mid-August to the beginning of December.

Distribution. Only known from the type locality.

Scaphidysderina cotopaxi Platnick & Dupérré, 2011

New records. ECUADOR: *Cotopaxi Province*: OTONGA Biological Reserve, 21.vi.–02.vii.2014, 1♂3♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); (00.41433°S, 79.00035°W) 1888m, 16.viii.–05.ix.2014, 2♂, E. Tapia, C. Tapia, N. Dupérré (ZMH); (00.41564°S, 79.00425°W) 2105m, 08–21.vi.2014, 1♂, E. Tapia, C. Tapia, N. Dupérré (ZMH); 05-19.ix.2014, 2♂2♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 13–25.xi.2014, 2♂, E. Tapia, C. Tapia, N. Dupérré (ZMH); 25.xi.–08.xii.2014, 2♂, E. Tapia, C. Tapia, N. Dupérré (ZMH); (00.41564°S, 79.00425°W) 2225m, 24.v.–08.vi.2014, 2♂, E. Tapia, C. Tapia, N. Dupérré (ZMH); 05–16.viii.2014, 1♂ E. Tapia (ZMH); 16.viii.–05.ix.2014, 3♂, E. Tapia, C. Tapia, N. Dupérré (ZMH); 13–25.xi.2014, 3♂3♀, E. Tapia (DTC); 25.xi.–08.xii.2014, 1♂1♀, E. Tapia, C. Tapia, N. Dupérré (AMNH).

Natural history. In our study, all specimens except one were collected between 2105 and 2225m. Specimens in a previous study were collected between 300 and 3865m (Platnick and Dupérré 2011).

Distribution. Cotopaxi, Pichincha, Los Ríos, Manabí and Santo Domingo de los Tsáchilas Provinces (Ecuador).

Scaphidysderina pinocchio Platnick & Dupérré, 2011

New records. ECUADOR: *Cotopaxi Province*: OTONGA Biological Reserve, Las Damas (00.39506°S, 78.98100°W) 1209m, 28.vi.–12.vii.2014, 6♀, pitfall, E. Tapia (ZMH); 12–23.vii.2014, 2♂1♀, pitfall, E. Tapia (DTC); 16.viii.–03.ix.2014, 3♂, pitfall, E. Tapia (ZMH).

Natural history. Only few specimens were collected in this study, all at 1209m. Based on Platnick & Dupérré 2011, specimens were found between 200 and 2800m.

Distribution. Pichincha, Cotopaxi, Los Ríos and Manabí Provinces (Ecuador).

Genus *Reductoonops* Platnick & Berniker, 2011

Type species. *Reductoonops yasuni* Platnick & Berniker, 2011.

Diagnosis. Clypeus flattened; four spinnerets; often with only two eyes; four pairs of deep grooves on the sides of the sternum, the most anterior pair of which demarcate a short anterior portion of the sternum (Platnick and Berniker 2011: 6).

Composition and distribution. Thirty-five species distributed in Mexico, Costa Rica, Jamaica, Curaçao, Martinique, Panama, Colombia, Ecuador, Peru and Chile.

Reductoonops berun sp. n.

http://zoobank.org/83622B7B-5874-4A25-9018-E7818CE82D67

Figs 18–21, 34

Type material. Male holotype and male paratype from Ecuador, Cotopaxi Province, OTONGA Biological Reserve, 04–07.ix.2014, sifting litter, Berlese, E. Tapia, C. Tapia, N. Dupérré (QCAZ). Female allotype, same data.

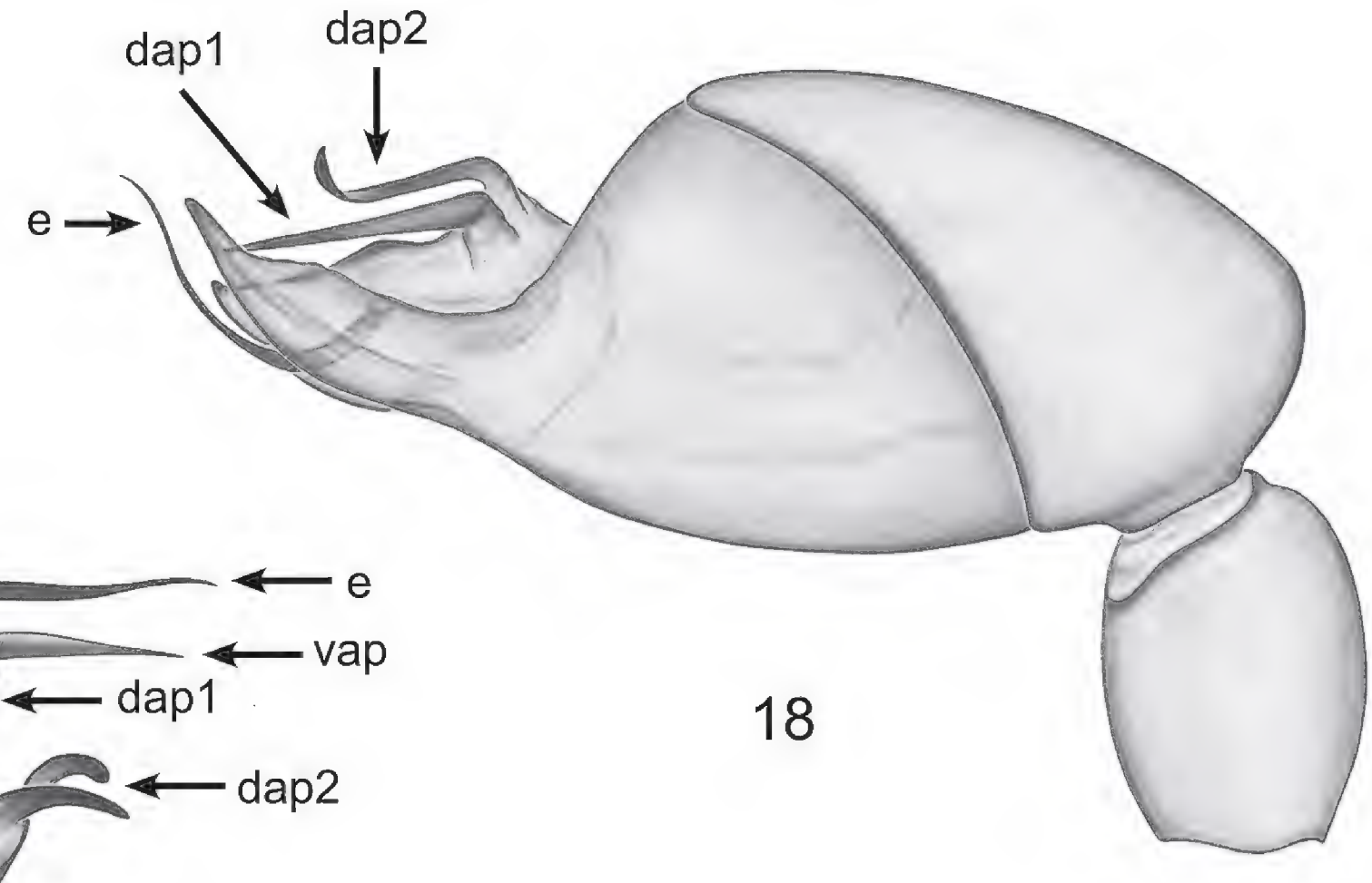
Additional material. *Cotopaxi Province*: OTONGA Biological Reserve, 24–30.v.2014, 1♂, sifting litter, Berlese, E. Tapia, C. Tapia, N. Dupérré (ZMH); 08–21.vi.2014, 9♂2♀, sifting moss, Berlese, E. Tapia, C. Tapia, N. Dupérré (ZMH); 04–07.ix.2014, 4♂4♀, sifting litter, Berlese, E. Tapia, C. Tapia, N. Dupérré (ZMH).

Etymology. The specific epithet is a noun in apposition taken from the Tsafi´ki languange, meaning "fish hook" for the shape of the dorsal apophysis of the male palp.

Diagnosis. Males and females are similar to *R. hedlite* and *R. tandapi* by the presence of two large, reflective eyes. Males are distinguished from *R. tina* Platnick & Berniker, 2011 by their double hook-shaped dorsal apophysis (dap2), simple in the latter species (Platnick and Berniker 2011; fig 392); from *R. tandapi* Platnick & Berniker, 2011 by the spine-like dorsal apophysis (dap1), bidentate in the later (Platnick and Berniker 2011; fig 367). Females are distinguished by their elongated oval, truncated apically anterior genitalic process (Fig. 21); sinuous and subdistally narrowed in *R. tina* Platnick & Berniker, 2011.

Description. Male (holotype). Total length: 0.9; carapace length: 0.5; carapace width: 0.3.

COLORATION: Carapace, sternum, mouthparts beige, without pattern; abdomen beige, without pattern; legs pale beige (Fig. 34). CARAPACE: Piriform in dorsal view (Fig. 34); elevated portion of pars cephalica finely reticulate, sides finely reticulate. Fovea absent, lateral margin undulate. Clypeus margin strongly rebordered, sinuous in front



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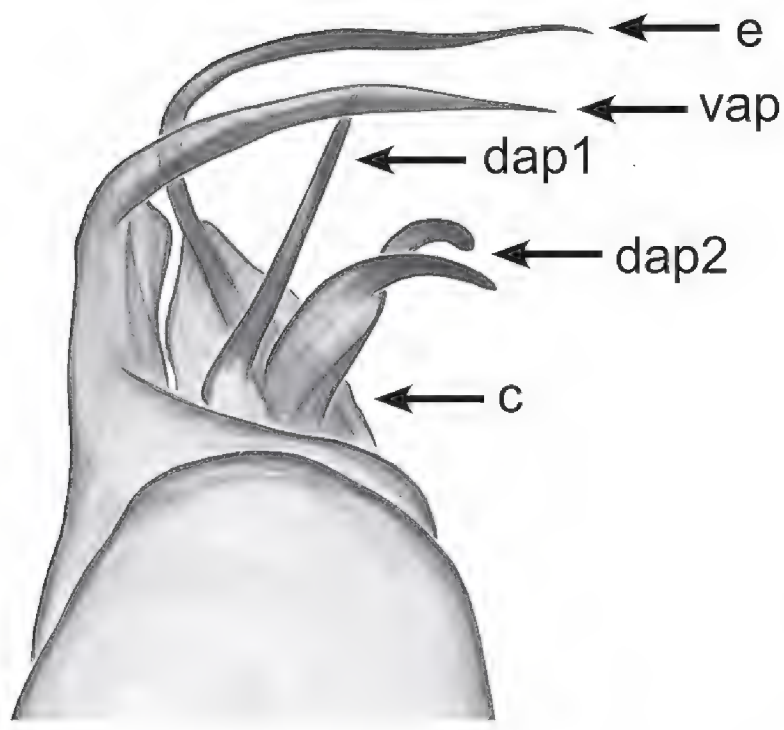

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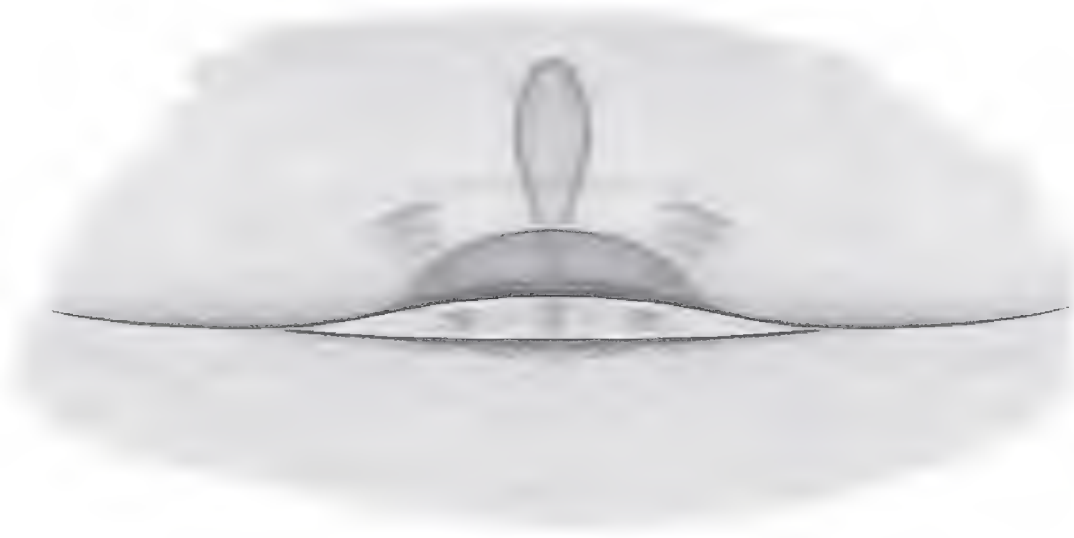

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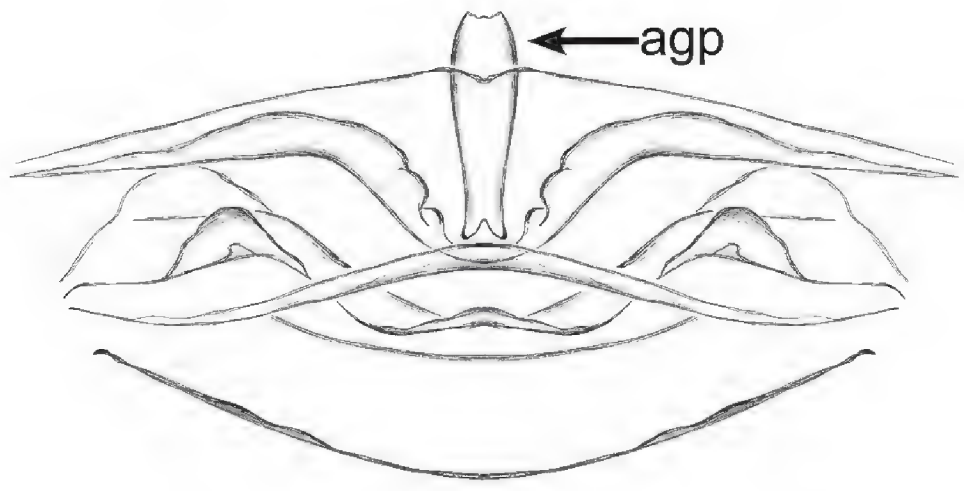

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Figures 18–21. *Reductoonops berun* sp. n. Male (**18, 19**). Female (**20, 21**). **18.** Palp, retrolateral view. **19.** Detail of embolus and adjacent structures, dorsal view. **20.** Epigynal region, ventral view. **21.** Internal genitalia, dorsal view.

view, sloping forward in lateral view. Sternum longer than wide, surface smooth, radial furrows between coxae I–II, II–III, III–IV smooth, with an additional radial between endites and coxae I. Chelicerae straight, cheliceral teeth not observed. Labium triangular, not fused to sternum, anterior margin slightly incised at middle. Endites elongated, triangular tip. EYES: Two large, reflective eyes, separated by half their radius (Fig. 34). ABDOMEN: Cylindrical (Fig.

34). Booklung covers large, ovoid. Dorsal scutum absent. Epigastric scutum weakly sclerotized, not surrounding pedicel. Postepigastric scutum weakly sclerotized, yellow, short, only around epigastric furrow, not fused to epigastric scutum. Spinneret scutum, supraanal scutum both absent. LEGS: Leg formula 4123; spineless. GENITALIA: Male palp not strongly sclerotized (Fig. 18); cymbium ovoid in dorsal view, cup-shaped; bulb longer than the sclerotized cymbium (Fig. 18); embolus flagellum-like, basally sinuous, accompanied dorsally by conductor (c), ventrally by a wide, apically pointed ventral apophysis (vap), dorsally with two apophysis, one spine-like (dap1) and one double hook-shaped (dap2) (Figs 18, 19).

Female. Total length: 1.1; carapace length: 0.6; carapace width: 0.3.

COLORATION: As in male. CARAPACE, EYES and ABDOMEN: As in male.

LEGS: As in male; female palp without claw. GENITALIA: Anterior genitalic process somewhat visible through the epigastric scutum, epigastric scutum margin with a wide trapezoid sclerotized area medially (Fig. 20); anterior genitalic process elongated oval, truncated apically, process set in wide wing-like structure (Fig. 21).

Natural history. Specimens were collected by sifting litter or mosses.

Distribution. Only known from the type locality.

Reductoonops otonga Platnick & Berniker, 2014

New records. ECUADOR: *Cotopaxi Province*: OTONGA Biological Reserve, 24–30.v.2014, 1♂3♀, sifting litter, Berlese, E. Tapia, C. Tapia, N. Dupérré (ZMH); 21.vi.2014, 1♀, sifting moss at 2225m, E. Tapia, C. Tapia, N. Dupérré (ZMH); 04–07.ix. 2014, 5♂6♀, sifting litter, Berlese, E. Tapia, C. Tapia, N. Dupérré (DTC); (00.41994°S, 79.00623°W) 1997m, 1♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); Las Damas (00.39506°S, 78.98100°W) 1209m, 28.vi.–12.vii.2014, 4♂6♀, sifting litter, E. Tapia, C. Tapia, N. Dupérré (ZMH).

Natural history. Most specimens were collected by sifting litter or mosses.

Distribution. Known from Santo Domingo de los Tsáchilas and Cotopaxi provinces (Ecuador).

Reductoonops pichincha Platnick & Berniker, 2014

New records. ECUADOR: *Cotopaxi Province*: OTONGA Biological Reserve, 04–07.ix. 2014, 2♀, sifting litter, Berlese, E. Tapia, C. Tapia, N. Dupérré (ZMH).

Distribution. Pichincha and Cotopaxi Provinces (Ecuador).

Genus *Bipoonops* Bolzern, 2014

Type species. *Bipoonops pucuna* Bolzern, 2014.

Diagnosis. Carapace with an indistinct, dark spot on the posterior half. Abdomen highly patterned. Dorsal abdominal scutum present in males with dorsal scutum anteromedially fused to the epigastric scutum, absent in females. Leg spines present. Males cymbium and bulb not fused; bipartite conductor. Females differ in having a very short postepigastric scutum surrounding the pedicel, almost as wide as, not fused to the epigastric scutum, and in lacking small lateral sclerites at the epigastric area (Bolzern 2014: 56).

Composition and distribution. Five species found only in Ecuador.

Bipoonops lansa sp. n.

http://zoobank.org/5478B2BC-A026-4D29-9D47-9B82564B42EE
Figs 22, 23, 35

Type material. Male holotype from Ecuador, Cotopaxi Province, OTONGA Biological Reserve (00.41433°S, 79.0035°W) 1888m, 19.ix.–02.x.2014, pitfall, E. Tapia, C. Tapia, N. Dupérré (QCAZ). Paratypes from Ecuador, Cotopaxi Province, OTONGA Biological Reserve (00.41433°S, 79.0035°W) 1888m, 16.viii.–05.ix.2014 2♂, E. Tapia, C. Tapia, N. Dupérré (ZMH).

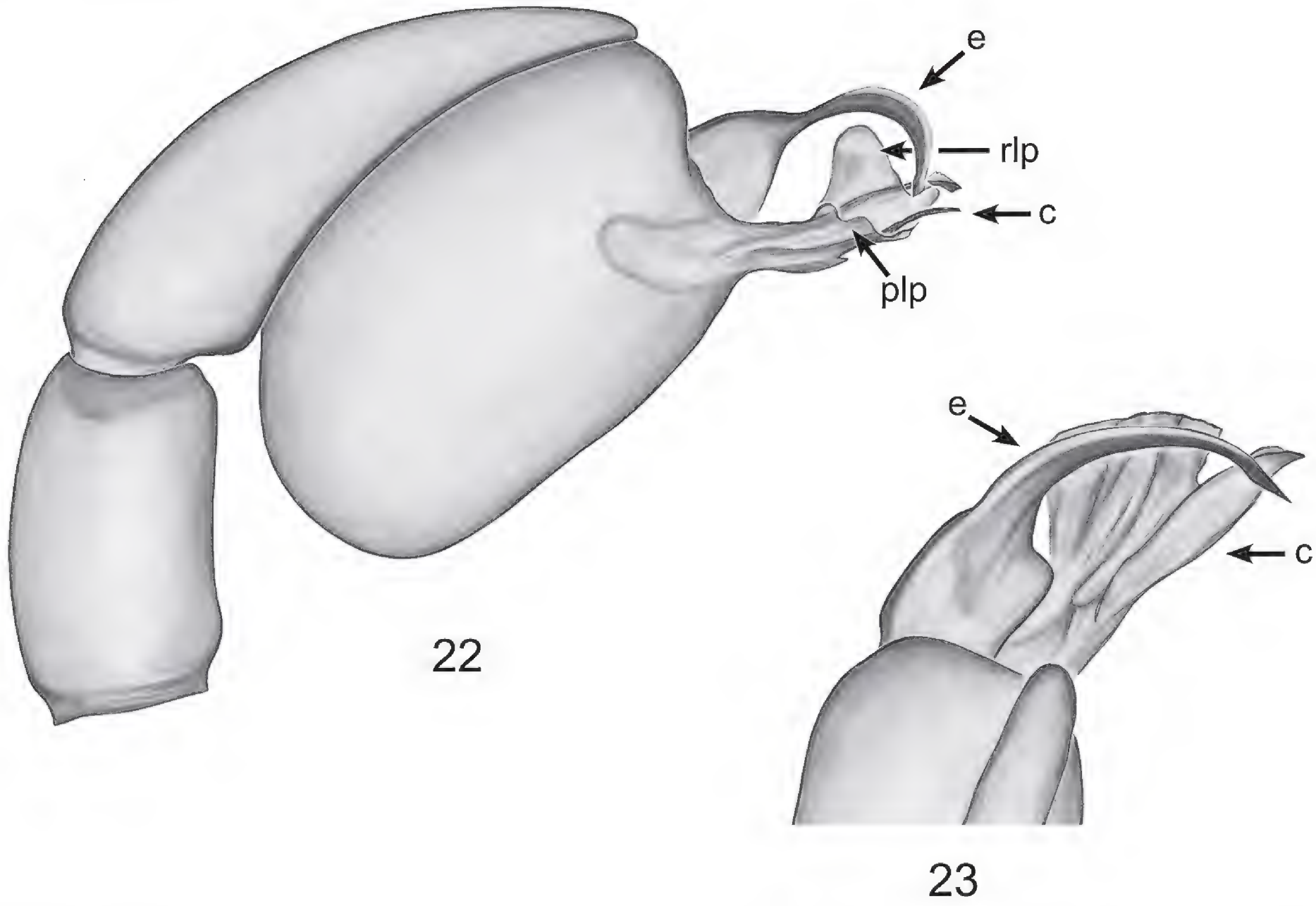
Additional material. *Cotopaxi Province*: OTONGA Biological Reserve (00.41941°S, 78.98607°W) 1717m, 24–30.v.2014, 3♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); (00.41433°S, 79.0035°W) 1888m, 8–21.vi.2014, 1♂, 16.viii.–05.ix.2014, 2♂, 13–25.xi.2014, 1♂, 19.ix.–02.x.2014, 1♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH).

Etymology. The specific epithet is a noun in apposition taken from the Tsafi´ki languange, meaning ‘orange’.

Diagnosis. Males are distinguished from all species by the short, strongly curved embolus and the small waved prolateral extension of the conductor (Fig. 22); from *B. baobab* Bolzern, 2014 by the large and rounded retrolateral process of the conductor (Fig. 22) which is absent in the latter (Bolzern 2014, fig. 511).

Description. Male (holotype). Total length: 1.5; carapace length: 0.7; carapace width: 0.6.

COLORATION: Carapace orange-brown with darkened spot on posterior half of carapace (Fig. 35); sternum, mouthparts pale orange-brown; dorsal abdominal scutum orange; legs orange; abdomen soft portion withish with indistinct netlike pattern (Fig. 35). CEPHALOTHORAX: Broadly oval in dorsal view (Fig. 35), pars cephalica slightly elevated in lateral view; surface of elevated portion and sides of pars cephalica finely reticulate; fovea absent. Clypeus margin unmodified, straight in frontal view, vertical in lateral view. Sternum as wide as long, not fused to carapace, surface smooth. Labium rectangular, fused to sternum, not indented at middle. Endites with anteromedian projection with 5-6 setae. Chelicerae slightly divergent; cheliceral teeth not observed. EYES: Six eyes, well developed, all subequal, ALE oval, PME squared, PLE oval; posterior eye row straight from



Figures 22, 23. *Bipoonops lansa* sp. n., male. **22.** Palp, prolateral view. **23.** Detail of embolus and adjacent structures, dorsal view.

above; ALE touching, ALE-PLE touching, PME touching throughout most of their length, PLE-PME touching. ABDOMEN: Oval; book lung covers large, ovoid; only anterior spiracles connected by groove. Dorsal scutum present, strongly sclerotized, without color pattern, covering more than of abdomen length and most of abdomen width, anteriorly fused to epigastric scutum, middle surface, sides smooth (Fig. 35). Epigastric scutum strongly sclerotized, surrounding pedicel entirely. Postepigastric scutum strongly sclerotized covering to nearly full abdomen length, almost semicircular, completely fused to epigastric scutum. Spinneret scutum present, supraanal scutum absent. LEGS: Leg formula 4123; leg spination: Femur I p0-1-1, tibia I v2-2-2-2, metatarsus I v2-2-2; femur II p0-0-1, tibia II v2-2-2-2, metatarsus II v2-2-2. GENITALIA: Male palp not strongly sclerotized (Fig. 22). Cymbium not fused with the bulb (Fig. 22). Embolus basally broad, flattened dorsoventrally, distally narrowing, tip bent prolaterally; conductor situated ventroprolaterally, dividing into a small wave like process prolaterally and a large rounded process retrolaterally (Figs 22, 23).

Female. Unknown.

Natural history. Only a few specimens were collected but all between 1717 and 1888m.

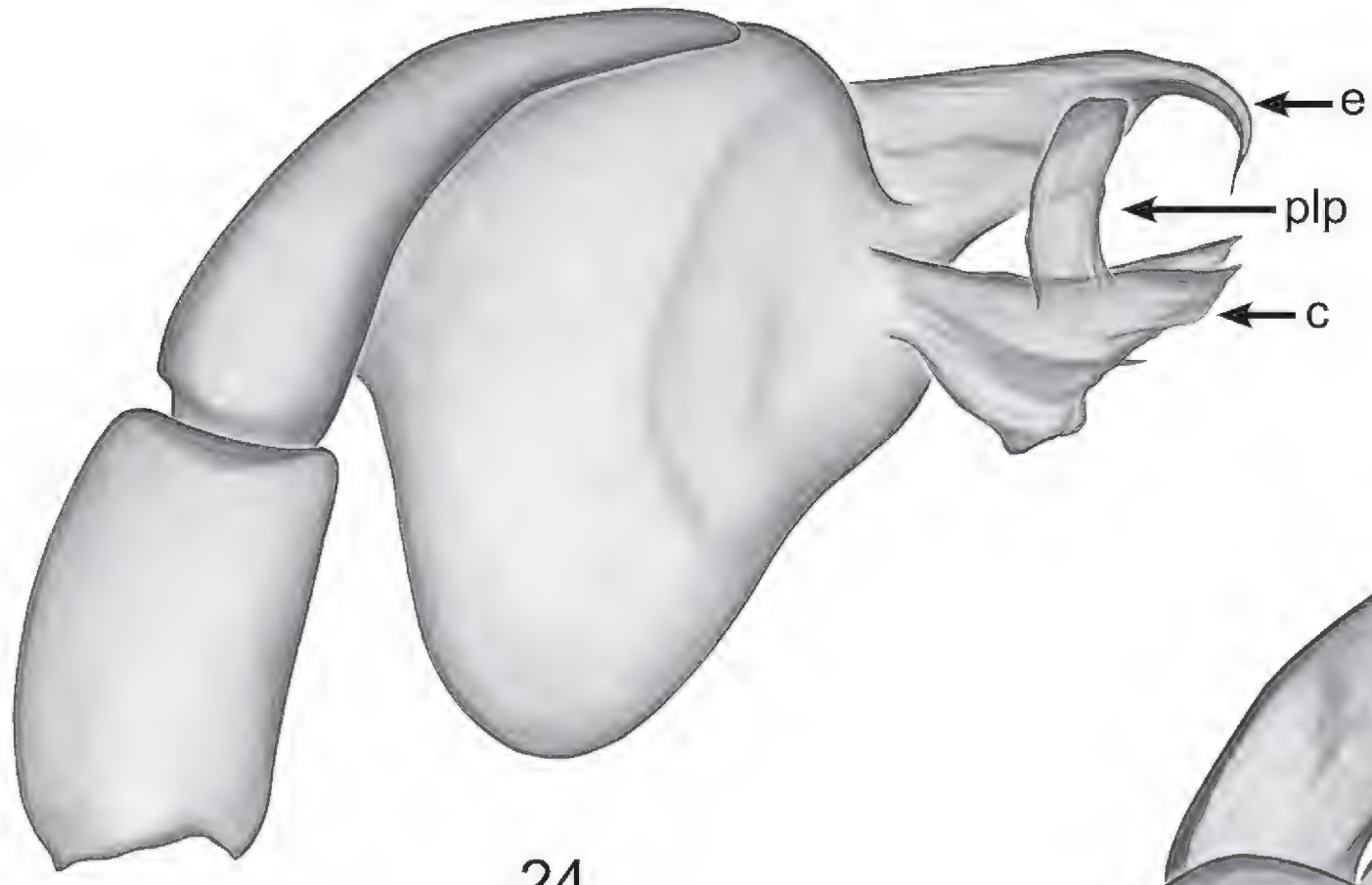
Distribution. Only known from the type locality.

Bipoonops pilan sp. n.

http://zoobank.org/EA4E1A42-9F41-4969-8A6C-ECE2C279E2EC
Figs 24–27

Type material. Male holotype from Ecuador, Cotopaxi Province, OTONGA Biological Reserve (00.41433°S, 79.0035°W) 1888m, 19.ix.–02.x.2014, pitfall, E. Tapia, C. Tapia, N. Dupérré (QCAZ). Paratypes from OTONGA Biological Reserve; 04–07.ix.2014, 4♂4♀ sifting litter, Berlese, E. Tapia, C. Tapia. N. Dupérré (ZMH).

Additional material. *Cotopaxi Province*: OTONGA Biological Reserve, 24–30.v.2014, sifting litter, Berlese, 1♂, pitfall, E. Tapia, C. Tapia. N. Dupérré (ZMH); (00.41994°S, 79.00623°W) 1997m, 08–21.vi.2014, 1♀, pitfall, E. Tapia, C. Tapia. N. Dupérré (QCAZ); 03–16.viii.2014, 1♂, pitfall, E. Tapia, C. Tapia. N. Dupérré (ZMH); 13–25.xi.2014, 1♂, pitfall, E. Tapia, C. Tapia. N. Dupérré (ZMH); 25.xi.–08.xii.2014, 2♂, pitfall, E. Tapia, C. Tapia. N. Dupérré (ZMH); (00.41564°S, 79.00425°W) 2105m, 03–16.viii.2014, 1♂4♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (DTC); 05–19.ix.2014, 1♂1♀, pitfall, E. Tapia, C. Tapia. N. Dupérré (ZMH); 13–25.xi.2014, 1♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 25.xi.–08.xii.2014, 1♂1♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (AMNH); (00.42261°S, 79.5107°W) 2225m, 16.viii.–05.ix.2014, 2♀, pitfall, E. Tapia, C. Tapia, N. Dupérré



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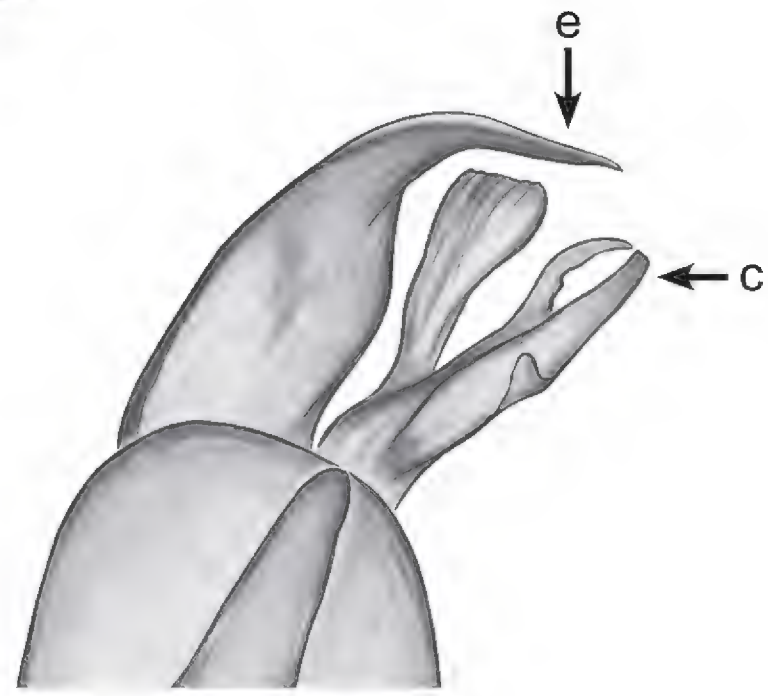

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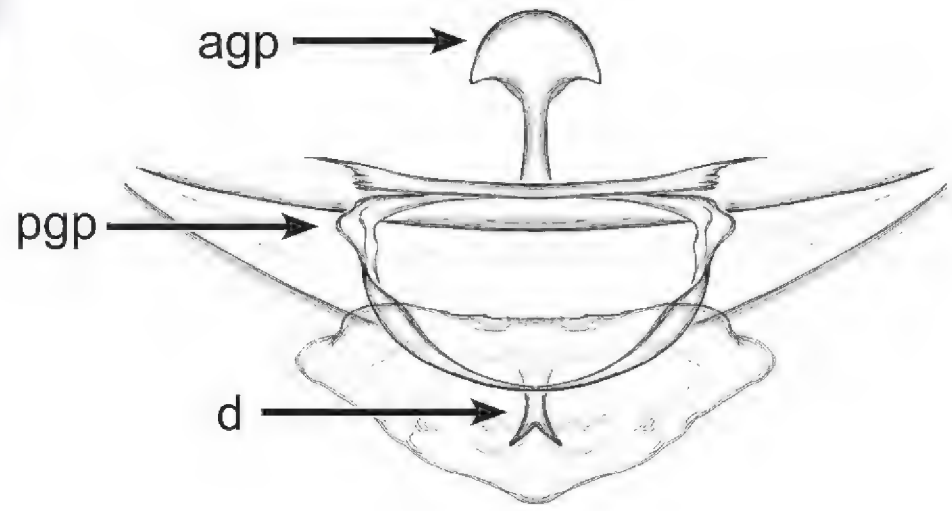

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Figures 24–27. *Bipoonops pilan* sp. n. Male 24, 25. Female 26, 27. **24.** Palp, prolateral view. **25.** Detail of embolus and adjacent structures, dorsal view. **26.** Epigynal region, ventral view. **27.** Internal genitalia, dorsal view.

(ZMH); 13–25.xi.2104, 2♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH).

Etymology. The specific epithet is a noun in apposition taken from the Tsafi´ki languange, meaning 'painted'.

Diagnosis. Males are distinguished by the large rectangular prolateral process of the conductor (Fig. 24), small and rounded in *B. pucuna* (Bolzern 2014, fig. 443), leaf-shaped in *B. tsachila* (Bolzern 2014, fig. 499), and small and triangular in *B. baobab* (Bolzern 2014, fig. 5111). Females are distinguished from *B. baobab* by the narrow stalk of the anterior genitalic process (Fig. 26), broadly stalked in the latter species (Bolzern 2014, fig. 519); from *B. pucuna*, by the small bipartite duct-like structure (Fig. 27), indistinct and bent dorsally in *B. pucuna* (Bolzern 2014, fig. 489).

Description. Male (holotype). Total length: 1.5; carapace length: 0.7; carapace width: 0.6.

COLORATION: Carapace pale orange-brown with darkened spot on posterior half of carapace; sternum, mouthparts pale orange-brown; dorsal abdominal scutum pale orange-brown; legs pale orange; abdomen soft

portion withish with indistinct wide netlike. CEPHALOTHORAX: Broadly oval in dorsal view, pars cephalica slightly elevated in lateral view; surface of elevated portion and sides of pars cephalica finely reticulate; fovea absent. Clypeus margin unmodified, straight in frontal view, vertical in lateral view. Sternum as wide as long, not fused to carapace, surface smooth. Labium rectangular, fused to sternum, not indented at middle. Endites anterior part with anteromedian projection with 5-6 setae. Chelicerae slightly divergent; cheliceral teeth not observed. EYES: Six eyes, well developed, all subequal, ALE oval, PME squared, PLE oval; posterior eye row straight from above; ALE separated by their radius, ALE-PLE touching, PME touching throughout most of their length, PLE-PME touching. ABDOMEN: Ovoid; book lung covers large, ovoid; only anterior spiracles connected by groove. Dorsal scutum present, strongly sclerotized, without color pattern, covering more than of abdomen length and most of abdomen width, anteriorly fused to epigastric scutum, middle surface, sides smooth. Epigastric scutum strongly sclerotized, surrounding pedicel entirely. Postepigastric scutum strongly sclerotized covering to nearly full abdomen length, almost semicircular, completely fused to epigastric scutum. Spinneret scutum present, reduced to two elongated platelets, supraanal scutum absent. LEGS: leg formula 4123. LEG SPINATION: Femur I p0-1-1, tibia I v2-2-2-2, metatarsus I v2-2-2; femur II p0-0-1, tibia II v2-2-2-2, metatarsus II v2-2-2. GENITALIA: Male palp not strongly sclerotized (Fig. 24). Cymbium not fused with the bulb (Fig. 24). Embolus basally broad, flattened dorsoventrally, distally narrowing, tip bent prolaterally; conductor situated ventroprolaterally, dividing into a large rectangular process prolaterally (Figs 24, 25).

Female. COLORATION: Overall as in male, except abdomen dorsally and ventrally with indistinct netlike pattern. CEPHALOTHORAX and EYES: overall as in male. ABDOMEN: Oval; book lung covers large, ovoid; epigastric and postepigastric scuta weakly sclerotized, not fused together. LEGS: As in male. Female palp without claw. GENITALIA: Epigynum, anterior genitalic process visible through the scutum (Fig. 26). Internal genitalia with anterior genitalic process narrowly stalked, apex enlarged; posterior genitalic process large, well sclerotized; small forked duct-like structure posteriorly (Fig. 27).

Natural history. Specimens were collected by sifting litter and by pitfall trap, between 1997 and 2225m.

Distribution. Only known from the type locality.

Genus *Orchestina* Simon, 1882

Type species. *Orchestina pavesii* (Simon, 1873).

Diagnosis. Males and females with swollen fourth femur; H-shaped eye arrangement, recurved PER; high clypeus; tarsal organs pattern (4-4-3-3); legs lacking spines. Male palpal tibia enlarged, papal bulb with conspicuous seminal duct (Henrard and Jocqué 2012; Izquierdo and Ramírez 2017).

Composition and distribution in America. Ninety-three species across the USA, Mexico, Guatemala, Costa Rica, Panama, Jamaica, Haiti, Dominican Republic, Trinidad and Tobago, Venezuela, Colombia, Ecuador, Peru, Brazil, Bolivia, Chile and Argentina.

Orchestina otonga Izquierdo, 2017

New records. *Cotopaxi Province*: OTONGA Biological Reserve, 04–07.ix.2014, 2♂1♀, moss, Berlese, E. Tapia, N. Dupérré (ZMH); (00.41433°S, 79.0035°W) 1888m, 15.x.2014, 31♂8♀, moss in trees 0.5–3m from ground, E. Tapia, N. Dupérré (AMNH); 13–15.xi.2014, 17♂8♀, moss in trees, Berlese, E. Tapia, C. Tapia, N. Dupérré (ZMH).

Natural history. All specimens were collected from mosses.

Distribution. Only known from Santo Domingo de los Tsáchilas and Cotopaxi Provinces (Ecuador).

Orchestina truncata Wunderlich, 2004

New records. *Cotopaxi Province*: OTONGA Biological Reserve, 24.v.–08.vi.2014, 3♂, sifting moss in trees, Berlese, E. Tapia, N. Dupérré (ZMH); 04–07.ix.2014, 1♂, sifting moss, Berlese, 2♀, beating, E. Tapia, C. Tapia, N. Dupérré (ZMH); (00.41433°S, 79.0035°W) 1888m, 15.x.2014, 3♂ moss in trees 0.5–3m from ground, E. Tapia, N. Dupérré (DTC).

Natural history. Only found in mosses.

Distribution. Costa Rica, Colombia and Ecuador.

Orchestina yanayacu Izquierdo, 2017

Male, Figs 28, 29

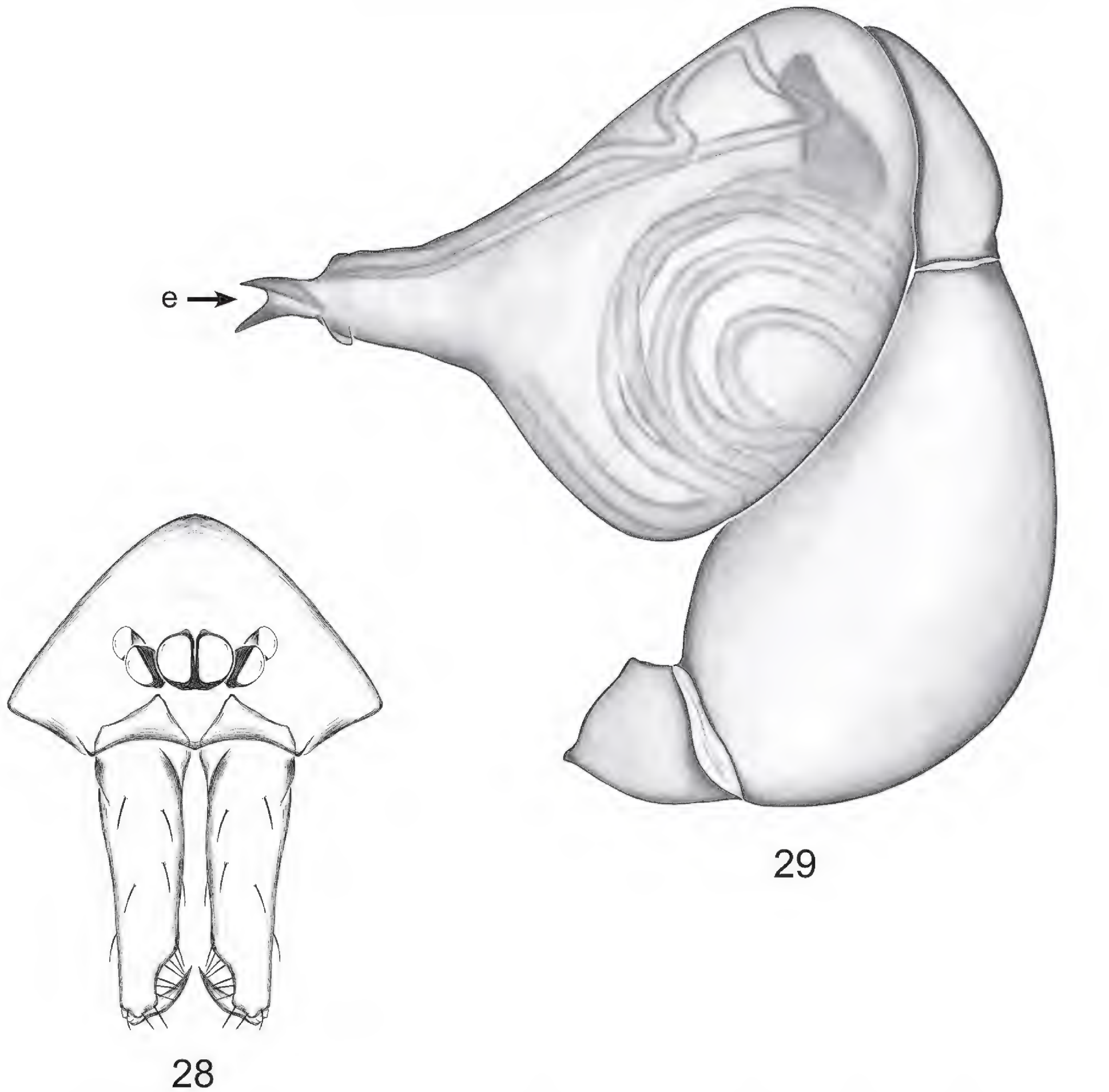
New records. *Cotopaxi Province*: OTONGA Biological Reserve (00.41433°S, 79.0035°W) 1888m, 15.x.2014, 1♂3♀, moss in trees 0.5–3m from ground, E. Tapia, N. Dupérré (ZMH); 13–15.xi.2015, sifting litter from epiphytes base, Berlese, 4♀, E. Tapia, N. Dupérré (ZMH).

Diagnosis. Male are easily recognized by their elongated chelicerae (Fig. 28) and the male palpal bulb with bi-pointed of embolus (Fig. 29).

Description. ***Male.*** Total length: 1.4; carapace length: 0.60; carapace width: 0.5.

COLORATION: Carapace light yellow, clypeus brown; chelicerae brown; sternum and endites light yellow; labium light brown; abdomen with indistinct gray pattern; legs light yellow.

CEPHALOTHORAX: Carapace ovoid in dorsal view, smooth; pars cephalica flat, pars thoracica sloping gradually. Clypeus low (1x PME), margin unmodified, sloping forward. Sternum as wide as long. Labium rectangular. Endites elongated. Chelicerae straight, long, without teeth (Fig. 28). EYES: Six, well developed, PME largest; all oval; posterior eye row recurved from above; ALE



Figures 28, 29. *Orchestina yanayacu* Izquierdo, 2017, male **28.** Carapace, anterior view. **29.** Male palp, retrolateral view.

separated by PME, ALE-PLE touching, PME touching throughout most of their length, ALE-PME touching (Fig. 28). ABDOMEN: Ovoid, soft without scutum. LEGS: Femur IV enlarged; otherwise without modifications or spines. LEGS: leg formula 1243. GENITALIA: Palpal tibia enlarged. Cymbium oval. Bulb oval tapering apically. Sperm duct spiraled with several loops. Embolus dark, sharply bi-pointed, with small ventral apophysis (Fig. 29).

Natural history. Found in mosses and epiphytes.

Distribution. Ecuador: Napo and Cotopaxi Provinces.

Note. Male and female a tentatively match as they were found in the same extraction sample, however on several occasions we found up to three *Orchestina* species in the same sample.

***Orchestina santodomingo* Izquierdo, 2017**

New records. *Cotopaxi Province*: OTONGA Biological Reserve, 24.v.–08.vi.2014, 2♀, moss in trees, E. Tapia, N. Dupérré (ZMH).

Natural history. Found in mosses.

Distribution. Only known from Santo Domingo de los Tsáchilas and Cotopaxi provinces (Ecuador).

***Paradysderina fusiscuta* Platnick & Dupérré, 2011**

New records. ECUADOR: *Cotopaxi Province*: OTONGA Biological Reserve, 24.v.–08.vi.2014, 2♂1♀, siftig litter, Berlese, E. Tapia, C. Tapia, N. Dupérré (ZMH);

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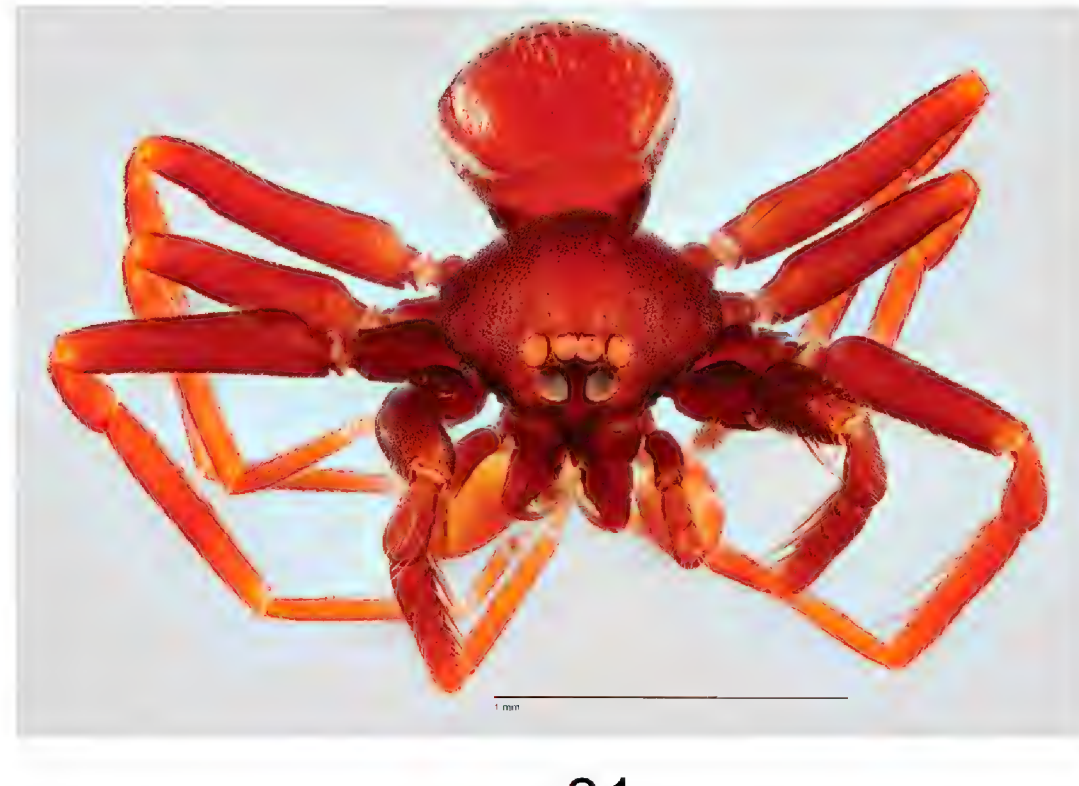

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Figures 30–33. 30. Male *Niarchos normani* sp. n., dorsal view. **31.** Male *Scaphidysderina lubanako* sp. n., frontal view. **32.** Male *Scaphidysderina lubanako* sp. n., dorsal view. **33.** Female *Scaphidysderina lubanako* sp. n., dorsal view.

04–07.ix.2014, 10♂11♀, siftig litter, Berlese, E. Tapia, C. Tapia, N. Dupérré (ZMH); OTONGA Biological Reserve, Las Damas (00.39506°S, 78.98100°W) 1209m, 28.vi.–12.vii.2014, 7♂4♀, pitfall, E. Tapia (QCAZ); 28.vi.–12.vii.2014, 8♂4♀, pitfall, E. Tapia, N. Dupérré (DTC); 28.vi.–12.vii.2014, 4♂1♀, sifting litter, Berlese, E. Tapia, N. Dupérré (ZMH); 23.vii.–05.viii.2014, 3♂7♀, pitfall, E. Tapia (ZMH); 05–16.viii.2014, 2♂, pitfall, E. Tapia (ZMH); OTONGA Biological Reserve, (00.41941°S, 78.99607°W) 1717m, 03–16.viii.2014, 2♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (DTC); (00.41433°S, 79.00035°W) 1888m, 16.viii.–05.ix.2014, 9♂2♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); (00.41994°S, 79.00623°W) 1997m, 21.vi.–02.vii.2014,

34 35

Figures 34, 35. 34. Female *Reductoonops berun* sp. n., dorsal view. **35.** Male *Bipoonops lansa* sp. n., dorsal view.

2♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 03–16.viii.2014, 6♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); (00.42261°S, 79.5107°W) 2225m, 08–21.vi.2014, 4♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 03–16.viii.2014, 5♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 16.viii.–05.ix.2014, 12♂2♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (AMNH); 13–25.xi.2014, 4♂3♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (AMNH).

Natural history. Specimens were collected from 1209 to 2225m, by sifting litter or by pitfall trap, in early July and mid-August to mid-September.

Distribution. Cotopaxi and Pichincha Provinces (Ecuador).

Scaphiella pich Platnick & Dupérré, 2010

New records. ECUADOR: *Cotopaxi Province*: OTONGA Biological Reserve, Las Damas, (00.39506°S, 78.98100°W) 1209m, 28.vi.–12.vii.2014, 2♂1♀, sifting litter, Berlese, E. Tapia, (ZMH); 28.vi.2014, 2♂, sifting litter, E. Tapia (ZMH); 23.vi.–12.vii.2014, 3♂1♀, pitfall, E. Tapia (QCAZ); 12–23.vii.2014, 8♂5♀, pitfall, E. Tapia (AMNH); 23.vii.-05.viii. 2014, 6♂2♀, pitfall, E. Tapia (ZMH); 05–16.viii.2014, 3♂2♀, pitfall (QCAZ); 16.viii.–03.ix.2014, 4♂4♀, pitfall, E. Tapia (DTC); OTONGA Biological Reserve (00.41433°S, 79.00035°W) 1888m, 13–25.xi.2014, 1♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); OTONGA Biological Reserve (00.41564°S, 79.00425°W) 2105m, 2♂1♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH).

Natural history. Most specimens were collected below 1888m, by sifting litter or pitfall trap.

Distribution. Santo Domingo de los Tsáchilas and Cotopaxi Provinces (Ecuador).

Tinadyserina otonga Platnick et al., 2013

New records. ECUADOR: *Cotopaxi Province*: OTONGA Biological Reserve, 24–30.v.2014, 2♂1♀, hand collecting, 2♂2♀, beating, 1♂1♀, sifting litter, E. Tapia, C. Tapia, N. Dupérré (ZMH); 21.vi.2014, 4♂, sifting moss, E. Tapia, C. Tapia, N. Dupérré (ZMH); (00.41433°S, 79.00035°W) 1888m, 08–21.vi.2014, 1♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 21.vi.–02.vii.2014, 7♂1♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (DTC); (00.41994°S, 79.00623°W) 1997m, 08–21.vi.2014, 2♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 03-16.viii.2014, 9♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 16.viii.–05.ix.2014, 9♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 25.xi.–08.xii.2014, 3♂2♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); (00.41564°S, 79.00425°W) 2105m, 24–30.v.2014, 4♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 08–21.vi.2014, 3♂1♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (DTC); 03–16.viii.2014, 6♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 16.viii.–05.ix.2014, 11♂1♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (AMNH); (00.42261°S, 79.5107°W) 2225m, 24-30.v.2014, 4♂1♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (QCAZ); 08–21.vi.2014, 2♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 03–16.viii.2014, 9♂, pit-

fall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 16.viii.–05.ix.2014, 24♂2♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH); 13–25.xi.2014, 10♂1♀, pitfall, E. Tapia, C. Tapia, N. Dupérré (AMNH); 25.xi.–08.xii.2014, 10♂, pitfall, E. Tapia, C. Tapia, N. Dupérré (ZMH).

Natural history. Most specimens were collected between mid-August to mid-September.

Specimens were collected from 1480–2250m.

Distribution. Pichincha and Cotopaxi Provinces (Ecuador).

Tridysderina bellavista Platnick et al., 2013

New records. ECUADOR: *Cotopaxi Province*: OTONGA Biological Reserve, Las Damas (00.39506°S, 78.98100°W) 1209m, 28.vi.–12.vii.2014, 1♂, pitfall, E. Tapia, N. Dupérré (ZMH).

Distribution. Cotopaxi and Pichincha Provinces (Ecuador).

Gamasomorpha sp.

Material examined. *Cotopaxi Province*: OTONGA Biological Reserve, 24.v.–08.vi.2014, 1♂1♀, hand-collected, E. Tapia, C. Tapia, N. Dupérré (ZMH).

Unknown genus

Material examined. *Cotopaxi Province*: OTONGA Biological Reserve, Las Damas (00.39506°S, 78.98100°W) 1209m, 28.vi.–12.vii.2014, 7♂2♀, 23.vii.–05.viii. 2014, 1♂7♀, 05–16.viii.2014, 6♂7♀, pitfall, E. Tapia (ZMH).

Discussion

As stated by Dupérre and Tapia (2016), there have been few spider biodiversity studies in neotropical premontane-, low evergreen- and cloud forests (Yanoviak et al. 2003, Peckmezian 2009, Maya-Morales et al. 2012) and assessments of arthropod biodiversity in these systems are still rare. In addition, the comparison between studies is difficult, due to the differences in methodology and collecting techniques. Most studies tend to focus on a particular habitat (canopy, forest understory or ground), use only few collecting techniques, and are done over a short period of time. We collected spiders from various habitats except the canopy, used five different collecting techniques, had four sessions of one week sampling week each, and ran pitfall traps for four consecutive months. Though not complete and mostly qualitative, this biodiversity assessment represents a more complete view of the arachnofauna assemblage found in these types of neotropical forests. The fact that none of the other studies even mentionned the family Oonopidae in their results is an obvious bias due to the choice of their collecting technique, habitat focus and time period. Yanoviak et al. (2003) and Maya-Morales et al. (2012), for example, focussed their studies on spider assemblages found in trees and forest understory, while Peckmezian (2009) studied different habitats and used different techniques but only applied them for a period of six days. As such, it is not surprising that our results are quite different, and reveal for the first time that the family Oonopidae turns out to be a very important component in Neotropical forests. The complementarity of techniques and microhabitats is crucial, for example Dupérré and Tapia (2016) showed that in the family Anyphaenidae, a well known arboreal group, the genus *Katissa* was almost exclusively collected in moss from trees, while other species were collected by beating or night collecting. In the family Oonopidae, *Reductoonops* and *Orchestina* were collected almost exclusively by sifting litter and mosses (only one male of *Reductoonops* was collected by pitfall); while other genera were practically only collected in pitfall traps, and clearly more abundant in a certain period of the year (*Scaphidysderina*, *Tinadyserina*). The importance of the family Oonopidae has been shown in other types of habitats, such as in a fragmented urban Atlantic forest of Brazil. Dias et al., (2005) showed that oonopids constituted over 20% of the adult spiders captured, and over 9% of the total species diversity; ranking second after Salticidae, both in abundance and diversity. Sørensen (2004) and Fannes et al. (2008) also showed that oonopids were important in Afrotropical montane forest, rainforests and savannah forest canopies. Sørensen (2004) proposed that at some sites Oonopidae constitute a major element of the arboreal spider fauna in terms of abundance (17%) of all adult spiders collected. Fannes et al. (2008) showed that in two lowland rainforests oonopids were second in abundance after Theridiidae, accounting for 10.4%–16.4% and in two savannah sites. Oonopids also ranked second in terms of abundance contributing 14.9%–21.9%.

Our results also show that the genus *Scaphidysderina* has a very interesting pattern of altitudinal distributions. The three most abundant species *Scaphidysderina chirin* sp. n., and *S. lubanako* sp. n., were collected respectively between 1209–1888m and 1209–1997m and are therefore found in the low evergreen montane forest, while *S. tsaran* sp. n. was only collected between 2105–2225m in the cloud forest, and consequently could represent a cloud forest specialist. A similar pattern was also discovered in the family Ctenidae (Dupérré 2015), four species, *Chococtenus cuchilla*, *C. fantasma*, *C. neblina*, *C. waitti* and *C. kashakara* were collected between 1997–2225m, and therefore were hypothesized as cloud forest specialists.

The forests of the Chocó region of Ecuador are under heavy threat from farming and logging (Sierra et al. 2003, Rival 2004). Approximately 46% of South Ecuador's original forest have already been converted into pastures and other anthropogenic land types (Tapia-Armijos et al. 2015). The evaluation of biodiversity of this well-known hotspot is largely based on the study of vertebrate ani-

mals and plants and almost nothing is known about arthropod diversity. We present here some preliminary data about the importance and diversity of spiders found in this threathened region, in hope that this gives one more argument to strengthen and ensure the protection of this unique environment.

Acknowledgements

Thanks to the National Geographic Society for funding "Spider biodiversity of the cloud forest in the Chocó region of Ecuador" project through the Waitt Grants program. Thanks to Dr. Danilo Harms for support, to Dr. Giovanni Onore and Dr. Luis Coloma for friendship and technical support, and to Italo Tapia, César Tapia and Carmen Caisaguano for their help in collecting. Thanks to Mathias Izquierdo and an anonymous referee for positive comments that help improve the manuscript. The collection of specimens was done under the permit (N° 006-14 IC-FAU-DNB/MA) of the Ministerio de Ambiente, Quito, Ecuador.

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